David E. Irwin

CONTACT INFORMATION

University of Massachusetts Amherst
Electrical and Computer Engineering
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INTERESTS

I lead the Sustainable Computing Lab (http://www.sustainablecomputinglab.io) where we design, build, and analyze distributed software systems with a particular emphasis on efficiency and sustainability.

EDUCATION

Duke University. Ph.D. in Computer Science, December 2007
Advisor: Jeffrey S. Chase
Committee: Landon Cox, Carla Ellis, and Parthasarathy Ranganathan
Dissertation: *An Operating System Architecture for Networked Server Infrastructure*

Duke University. Master of Science in Computer Science, December 2005
Advisor: Jeffrey S. Chase

Vanderbilt University. Bachelor of Science, May 2001 (*magna cum laude*)
Double Major: Computer Science and Mathematics

ACADEMIC APPOINTMENTS

University of Massachusetts Amherst
Professor, Department of Electrical and Computer Engineering, 9/23-present
Adjunct Associate Professor, College of Information and Computer Sciences, 9/19-present
Associate Professor, Department of Electrical and Computer Engineering, 9/19-8/23
Adjunct Assistant Professor, College of Information and Computer Sciences, 2/13-8/19
Assistant Professor, Department of Electrical and Computer Engineering, 9/12-8/19
Postdoctoral Research Associate, Department of Computer Science, 9/07-8/12

Duke University
Research Assistant, Department of Computer Science, 9/01-8/07

INDUSTRY APPOINTMENTS

Hewlett-Packard Research Lab
Research Intern, 3/04-9/04

IBM T.J. Watson Research Center
Research Intern, 5/03-8/03

HONORS AND AWARDS

ISCA '06 paper selected in 2023 as one of best papers in ISCA over last 25 years (1996-2020)
ICPE '23 paper nominated for Best Paper Award (top 2 out of 15 accepted papers)
IGSCC '23 on decarbonizing heating selected as Best Student Paper Award
IGSCC '23 on carbon-aware provisioning of web services selected as Best Paper Award Runner-up
BuildSys '21 paper selected as Best Paper Award runner-up (top 2 out of 107 submissions)
EuroSys '21 paper awarded Artifact Available, Artifacts Functional, and Results Reproduced Badge
Supercomputing '20 paper selected as Best Paper Award finalist (7 out of 380 submissions)
Supercomputing '20 paper selected as Best Student Paper Award finalist (7 out of 380 submissions)
IGSC '20 phone-based temperature sensing paper selected as Best Paper Award
e-Energy '20 paper selected as Best Paper Award runner-up (top 2 out of 88 submissions)
Google Faculty Research Award '19. Selected as one of 158 projects funded out of 910 submissions
Barbara H. and Joseph I. Goldstein Outstanding Junior Faculty Award '18
BuildSys '17 Grid fairness paper nominated for Best Paper Award (top 5 out of 96 submissions)
Greenmetrics '17 Keynote Talk - "Staring at the Sun: Solar Analytics and their Privacy Implications"

Google Faculty Research Award '16. Selected as one of 151 projects funded out of 950 submissions
BuildSys '14 PowerPlay paper selected as Best Paper Award Finalist (top 3 out of 59 submissions)
BuildSys '14 microgrid paper selected as Best Paper Award Finalist (top 3 out of 59 submissions)
NSF CAREER Award '13 for "Model-based Energy Management for Sustainable Buildings"
e-Energy '13 paper selected as Best Paper Award Runner-up (top 2 out of 76 submissions)
HPDC '03 paper selected in 2012 as one of 20 best papers in HPDC's first 20 years (1992-2012)
PerCom '12 paper one of three to appear in Best Papers Session (top 3 out of 150 submissions)
ASPLOS '11 paper selected as IEEE Sustainable Computing Register's Pick of the Month (June 2012)
GreenNets '11 paper receives Best Paper Award (out of 19 submissions)
Orca software, designed as part of Ph.D. dissertation, selected in 2008 as NSF GENI control framework

PUBLICATION CONTEXT

Graduate and undergraduate students that I have advised are listed in bold. Students that I have advised as part of extending course projects for publication are underlined. All papers are available at `https://www.davidirwin.info/papers`. Overall, my work has received over 9700 citations with an *h*-index of 42 on Google Scholar (see `https://scholar.google.com/citations?user=FbvaN0UAAAAJ&hl=en`). By convention, in my field, student authors are listed first in order of contribution followed by senior authors in order of contribution.

Note that, in computer systems research, the top conferences are generally considered more important than the top journals. Top conferences use a rigorous review process in which multiple (3-7) program committee members evaluate each submitted paper. The top conferences also often "shepherd" accepted papers, where the program committee member supervises revisions for accepted papers according to the reviewers' comments. In terms of acceptance rates, top conferences in computer systems typically accept $<$30% of submitted papers. Some conferences also follow a hybrid journal model with multiple deadlines each year, and an opportunity for revisions and resubmission. The Association for Computing Machinery (ACM), the primary professional organization for computer systems research, provides specific guidelines for hybrid conference/journals at `https://www.acm.org/publications/pacm/introducing-pacm`.

For more details on the unique role of conferences in computer systems research see the links below to a 1994 National Academy of Sciences report, Chapter 4 in particular, and the Computing Research Association (CRA) Best Practices Memo.

`http://www.nap.edu/openbook.php?record_id=2236`

`http://cra.org/resources/best-practice-memos/evaluating-computer-scientists-and-engineers-for-promotion-and-tenure/`

JOURNAL ARTICLES

Works in this category are refereed journal articles.

1. John Wamburu, Srinivasan Iyengar, Stephen Lee, David Irwin, and Prashant Shenoy. Analyzing the Energy Usage of a Community and the Benefits of Energy Storage. *ACM Journal on Computing and Sustainable Societies (JCSS)*, November 2023. To Appear.
2. Stephen Lee, Phuthipong Bovornkeeratiroj, Srinivasan Iyengar, David Irwin, and Prashant Shenoy. Distributed Rate Control of Smart Solar Arrays with Batteries. *Frontiers in Internet of Things*, 2:1–19, June 2023.
3. John Wamburu, **Noman Bashir**, Prashant Shenoy, and David Irwin. Analyzing the Impact of Decarbonizing Residential Heating Systems on the Electric Grid. In *ACM Energy Informatics Review*, volume 3, pages 47–60, June 2023.
4. John Wamburu, **Noman Bashir**, Emma Grazier, David Irwin, Christine Crago, and Prashant Shenoy. Equity-aware Decarbonization of Residential Heating Systems. *ACM Energy Informatics Review (EIR)*, 2(4):18–27, December 2022.
5. Stephen Lee, Prashant Shenoy, Krithi Ramamritham, and David Irwin. AutoShare: Virtual Community Solar and Storage for Energy Sharing. *Springer Energy Informatics*, 4(10), July 2021.
6. **Pradeep Ambati**, **Noman Bashir**, David Irwin, and Prashant Shenoy. Modeling and Analyzing Waiting Policies for Cloud-Enabled Schedulers. *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, 32(12):3081–3100, December 2021.

7. Menghong Feng, **Noman Bashir**, Prashant Shenoy, David Irwin, and Dragoljub Kosanovic. Model-driven Per-Panel Solar Anomaly Detection for Residential Arrays. *ACM Transactions on Cyber-Physical Systems (TCPS)*, 37(4):1–21, August 2021.
8. **Noman Bashir**, David Irwin, and Prashant Shenoy. A Probabilistic Approach to Committing Solar Energy in Day-ahead Electricity Markets. *Elsevier Sustainable Computing: Informatics and Systems (SUSCOM)*, 29:1–10, March 2021.
9. Amee Trivedi, Phuthipong Bovorkeeratiroj, Joe Breda, Prashant Shenoy, Jay Taneja, and David Irwin. Phone-based Ambient Temperature Sensing Using Opportunistic Crowdsensing and Machine Learning. *Elsevier Sustainable Computing: Informatics and Systems (SUSCOM)*, 29:1–10, March 2021.
10. Srinivasan Iyengar, Stephen Lee, David Irwin, Prashant Shenoy, and Benjamin Weil. WattScale: A Data-driven Approach for Energy Efficiency Analytics of Buildings at Scale. *ACM Transactions on Data Science (TDS)*, 2(1):1–24, January 2021.
11. **Pradeep Ambati** and David Irwin. Optimizing the Cost of Executing Mixed Interactive and Batch Workloads on Transient VMs. *Proceedings of the ACM on Measurement and Analysis of Computing Systems (POMACS)*, 3(2):28:1–28:24, 2019.
12. **Sean Kenneth Barker**, Sandeep Kalra, David Irwin, and Prashant Shenoy. Building Virtual Power Meters for Online Load Tracking. *ACM Transactions on Cyber-Physical Systems (CPS)*, 3(2):23:1–23:24, March 2019.
13. Srinivasan Iyengar, Sandeep Kalra, Anushree Ghosh, David Irwin, Prashant Shenoy, and Benjamin Marlin. Inferring Smart Schedules for Dumb Thermostats. *ACM Transactions on Cyber-Physical Systems (CPS)*, 3(2):17:1–17:29, March 2019.
14. **Noman Bashir**, David Irwin, Prashant Shenoy, and Jay Taneja. Mechanisms and Policies for Controlling Distributed Solar Capacity. *ACM Transactions on Sensor Networks (TOSN)*, 14(3-4):1–28, December 2018.
15. Cong Wang, David Irwin, and Michael Zink. Energy-agile Design for Parallel HPC Applications. *Elsevier Sustainable Computing: Informatics and Systems (SUSCOM)*, 19:123–134, September 2018.
16. Prateek Sharma, Stephen Lee, Tian Guo, David Irwin, and Prashant Shenoy. Managing Risk in a Derivative IaaS Cloud. *IEEE Transactions on Parallel and Distributed Computing (TPDS)*, 29(8):1750–1765, August 2018.
17. **Sean Barker**, David Irwin, and Prashant Shenoy. Pervasive Energy Monitoring and Control through Low-Bandwidth Power Line Communication. *IEEE Internet of Things Journal*, 4(5):1349–1359, October 2017.
18. Srinivasan Iyengar, Navin Sharma, David Irwin, Prashant Shenoy, and Krithi Ramamritham. A Cloud based Black Box Solar Predictor for Smart Homes. *ACM Transactions on Cyber-Physical Systems (TCPS), Special Issue on Smart Homes, Buildings, and Infrastructures*, 1(4):1–25, October 2017.
19. **Dong Chen** and David Irwin. Black-box Solar Performance Modeling: Comparing Physical, Machine Learning, and Hybrid Approaches. *ACM SIGMETRICS Performance Evaluation Review*, 45(2):79–84, September 2017.
20. Prateek Sharma, Patrick Pegus II, David Irwin, Prashant Shenoy, John Goodhue, and James Culbert. Design and Operation Analysis of a Green Data Center. *IEEE Internet Computing, Special Issue on Energy-Efficient Data Centers*, 21(4):16–24, July/August 2017.
21. Prateek Sharma, David Irwin, and Prashant Shenoy. Portfolio-driven Resource Management for Transient Cloud Servers. *Proceedings of the ACM on Measurement and Analysis of Computing Systems (POMACS)*, 1(1):1–23, June 2017.
22. Prateek Sharma, David Irwin, and Prashant Shenoy. Keep it Simple: Bidding for Servers in Today's Cloud Platforms. *IEEE Internet Computing*, 21(3):88–92, May/June 2017.
23. David Irwin, Srinivasan Iyengar, Stephen Lee, Aditya Mishra, Prashant Shenoy, and Ye Xu. Enabling Distributed Energy Storage by Incentivizing Small Load Shifts. *ACM Transactions on Cyber-Physical Systems (CPS)*, 1(2):1–25, February 2017.

24. Zhichuan Huang, Ting Zhu, David Irwin, Aditya Mishra, Daniel Menasche, and Prashant Shenoy. Minimizing Transmission Loss in Smart Microgrids by Sharing Renewable Energy. *ACM Transactions on Cyber-Physical Systems (TCPS)*, 1(2):1–25, February 2017.
25. Navin Sharma, Dilip Krishnappa, **Sean Barker**, David Irwin, and Prashant Shenoy. Managing Server Clusters on Intermittent Power. *PeerJ Computer Science*, e1(34):1–50, December 2015.
26. **Dong Chen**, Sandeep Kalra, David Irwin, Prashant Shenoy, and Jeannie Albrecht. Preventing Occupancy Detection from Smart Meter Data. *IEEE Transactions on Smart Grids (TOSG), Special Section on on Cyber Physical System and Security for Smart Grid*, 6:2426–2434, September 2015.
27. Navin Sharma, David Irwin, and Prashant Shenoy. BlinkFS: A Distributed File System for Intermittent Power. *Elsevier Sustainable Computing: Informatics and Systems (SUSCOM), Special Issue on Selected Papers from the 2013 IEEE International Green Computing Conference*, 6:69–80, June 2015.
28. Navin Sharma, Jeremy Gummeson, David Irwin, Ting Zhu, and Prashant Shenoy. Leveraging Weather Forecasts in Energy Harvesting Systems. *Elsevier Sustainable Computing: Informatics and Systems (SUSCOM)*, 4(3):160–171, September 2014.
29. **Sean Barker**, Sandeep Kalra, David Irwin, and Prashant Shenoy. Empirical Characterization, Modeling, and Analysis of Smart Meter Data. *IEEE Journal on Selected Areas of Communications (JSAC), Smart Grid Communications Series*, 32(7):1312–1327, July 2014. Acceptance Ratio: 16/57 = 28%.
30. Rahul Singh, Prateek Sharma, David Irwin, Prashant Shenoy, and K.K. Ramakrishnan. Here Today, Gone Tomorrow: Exploiting Transient Servers in Data Centers. *IEEE Internet Computing, Special Issue on Web-Scale Data Centers*, 18(4):22–29, July/August 2014.
31. Aditya Mishra, David Irwin, Prashant Shenoy, Jim Kurose, and Ting Zhu. GreenCharge: Managing Renewable Energy in Smart Homes. *IEEE Journal on Selected Areas of Communications (JSAC), Smart Grid Communications Series*, 31(7):1281–1294, July 2013. Acceptance Ratio: 15/73 = 21%.
32. Dilip Kumar Krishnappa, Eric Lyons, David Irwin, and Michael Zink. Cloud Computing for Short-term Weather Forecasts. *IEEE Computing in Science and Engineering (CiSE), Special Issue on Cloud Computing*, 15(4):30–37, July/August 2013.
33. Navin Sharma, David Irwin, Prashant Shenoy, and Michael Zink. MultiSense: Proportional-Share for Mechanically Steerable Sensor Networks. *Springer Multimedia Systems Journal (MMSJ)*, 18(5):425–444, October 2012.
34. David Irwin, Navin Sharma, and Prashant Shenoy. Towards Continuous Policy-driven Demand Response in Data Centers. *ACM SIGCOMM Computer Communications Review (CCR)*, 41(4):489–494, October 2011.

Archival Conference Proceedings

Works in this category are refereed papers in conferences. Acceptance rates are listed where known. See note above on the unique role of conferences in the publishing model for computer systems research.

35. Bin Wang, Prashant Shenoy, and David Irwin. INVAR: Inversion Aware Resource Provisioning and Workload Scheduling for Edge Computing. In *IEEE International Conference on Computer Communications (INFOCOM)*, Vancouver, Canada, May 2024. Acceptance Rate: 256/1307 = 20%.
36. Walid A. Hanafy, Qianlin Liang, **Noman Bashir**, David Irwin, and Prashant Shenoy. CarbonScaler: Leveraging Cloud Workload Elasticity for Optimizing Carbon-Efficiency. In *Proceedings of the ACM SIGMETRICS/IFIP Performance Conference*, pages 1–14, Venice, Italy, June 2024. Acceptance Rate (winter): 21/91 = 23%.
37. Diptyaroop Majo, **Noman Bashir**, David Irwin, Prashant Shenoy, and Ramesh K. Sitaraman. The Green Mirage: Impact of Location- and Market-based Carbon Intensity Estimation on Carbon Optimization Efficacy. In *Proceedings of the Fourteenth ACM International Conference on Future Energy Systems (e-Energy)*, Singapore, June 2024. Acceptance Rate (winter): 4/47 = 9%.
38. John Wamburu, Srinivasan Iyengar, Stephen Lee, David Irwin, and Prashant Shenoy. Analyzing the Energy Usage of a Community and the Benefits of Energy Storage. In *Proceedings of the ACM Conference on Computing Systems and Sustainable Societies (COMPASS)*, Delhi, India, July 2024.

39. Qianlin Liang, Walid A. Hanafy, **Noman Bashir**, David Irwin, and Prashant Shenoy. Energy Time Fairness: Balancing Fair Allocation of Energy and Time for GPU Workloads. In *Proceedings of the Eighth ACM/IEEE Symposium on Edge Computing (SEC)*, pages 1–14, Wilmington, Delaware, December 2023. Acceptance Rate: 18/71 = 25%.

40. **John Thiede**, **Noman Bashir**, David Irwin, and Prashant Shenoy. Carbon Containers: A System-level Facility for Managing Application-level Carbon Emissions. In *Proceedings of the Fourteenth ACM Symposium on Cloud Computing (SoCC)*, Santa Cruz, California, October 2023. Acceptance Rate: 40/129 = 31%.

41. **Xiaoding Guan**, **Noman Bashir**, David Irwin, and Prashant Shenoy. WattScope: Non-intrusive Application-level Power Disaggregation in Datacenters. In *Proceedings of the Forty-first IFIP International Symposium on Computer Performance, Modeling, Measurements and Evaluation (Performance)*, pages 1–21, Chicago, Illinois, November 2023. Acceptance Rate: 18/52 = 34%.

42. Anupama Sitaraman, **Noman Bashir**, David Irwin, and Prashant Shenoy. No Free Lunch: Analyzing the Cost of Deep Decarbonizing Residential Heating Systems. In *Proceedings of the Fourteenth International Green and Sustainable Computing Conference (IGSCC)*, Toronto, Canada, October 2023. **Best Student Paper Award**.

43. Abel Souza, Shruti Jasoria, Basundhara Chakrabarty, Alexander Bridgwater, Axel Lundberg, Filip Skogh, Ahmed Ali-Eldin, David Irwin, and Prashant Shenoy. CASPER: Carbon-Aware Scheduling and Provisioning for Distributed Web Services. In *Proceedings of the Fourteenth International Green and Sustainable Computing Conference (IGSCC)*, Toronto, Canada, October 2023. **Best Paper Award Runner-up**.

44. **Noman Bashir**, David Irwin, Fatima Anwar, Jeremy Gummeson, and Prashant Shenoy. Jointly Managing Electrical and Thermal Energy in Environmentally-powered Computer Systems. In *Proceedings of the Thirteenth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–13, June 2023. Acceptance Ratio (winter): 19/102 = 19%.

45. Qianlin Liang, Walid A. Hanafy, **Noman Bashir**, Ahmed Ali-Eldin, David Irwin, and Prashant Shenoy. Dělen: Enabling Flexible and Adaptive Model-serving for Multi-tenant Edge AI. In *Proceedings of the Eigth ACM/IEEE Conference on Internet of Things Design and Implementation (IoTDI)*, pages 1–12, San Antonio, Texas, May 2023. Acceptance Ratio: 33/109 = 30%.

46. **Talha Mehboob**, **Noman Bashir**, David Irwin, and Michael Zink. Is Sharing Caring? Analyzing the Incentives for Shared Cloud Clusters. In *Proceedings of the Fourteenth ACM/SPEC International Conference on Performance Evaluation (ICPE)*, Coimbra, Portugal, April 2023.

47. Abel Souza, **Noman Bashir**, Jorge Murillo, Walid Hanafy, Qianlin Liang, David Irwin, and Prashant Shenoy. Ecovisor: A Virtual Energy System for Carbon-Efficient Applications. In *Proceedings of the Twenty-Eighth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, pages 1–15, Vancouver, Canada, March 2023.

48. John Wamburu, **Noman Bashir**, David Irwin, and Prashant Shenoy. Data-driven Decarbonization of Residential Heating Systems. In *Proceedings of the Ninth ACM International Conference on Systems For Energy-Efficient Buildings, Cities, and Transportation (BuildSys)*, pages 1–11, November 2022. Acceptance Rate: 34/105 = 32%.

49. **Akansha Singh Bansal**, Trapit Bansal, and David Irwin. A Moment in the Sun: Solar Nowcasting from Multispectral Satellite Data using Self-Supervised Learning. In *Proceedings of the Thirteenth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–12, June 2022. Acceptance Rate: 27/92 = 29%.

50. Phuthipong Bovornkeeratiroj, John Wamburu, David Irwin, and Prashant Shenoy. PeakTK: An Open Source Toolkit for Peak Forecasting in Energy Systems. In *Proceedings of the ACM Conference on Computing Systems and Sustainable Societies (COMPASS)*, pages 1–11, Seattle, Washington, June 2022. Acceptance Rate: 37/100 = 37%.

51. Phuthipong Bovornkeeratiroj, John Wamburu, David Irwin, and Prashant Shenoy. VPeak: Exploiting Volunteer Energy Resources for Flexible Peak Shaving. In *Proceedings of the Eighth ACM International*

Conference on Systems For Energy-Efficient Buildings, Cities, and Transportation (BuildSys), pages 1–10, November 2021. Acceptance Ratio: 28/107 = 26%. **Best Paper Award Runner-up.**.

52. **Noman Bashir**, Tian Guo, Mohammad Hajiesmaili, David Irwin, Prashant Shenoy, Ramesh Sitaraman, Abel Souza, and Adam Wierman. Enabling Sustainable Clouds: The Case for Virtualizing the Energy System. In *Proceedings of the Twelfth ACM Symposium on Cloud Computing (SoCC)*, pages 1–8, Seattle, Washington, November 2021. Acceptance Ratio: 46/145 = 32%.
53. **Pradeep Ambati**, **Noman Bashir**, David Irwin, and Prashant Shenoy. Good Things Come to Those Who Wait: Optimizing Job Waiting in the Cloud. In *Proceedings of the Twelfth ACM Symposium on Cloud Computing (SoCC)*, pages 1–13, Seattle, Washington, November 2021. Acceptance Ratio: 46/145 = 32%.
54. **Noman Bashir**, Nan Deng, Krzysztof Rzadca, David Irwin, Sree Kodak, and Rohit Jnagal. Take it to the Limit: Peak Prediction-driven Resource Overcommitment in Datacenters. In *Proceedings of the Sixteenth ACM European Conference on Computer Systems (EuroSys)*, pages 1–18, April 2021. Acceptance Ratio: 38/191 = 19.9%. **Awarded Artifacts Available Badge, Artifacts Functional Badge, and Results Reproduced Badge. One of 14 accepted papers awarded all three badges.**.
55. John Wamburu, Stephen Lee, Mohammad Hajiesmaili, David Irwin, and Prashant Shenoy. Ride Substitution Using Electric Bikes: Feasibility, Cost, and Carbon analysis. In *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)*, pages 1–27, March 2021.
56. **Pradeep Ambati**, **Noman Bashir**, David Irwin, and Prashant Shenoy. Waiting Game: Optimally Provisioning Fixed Resources for Cloud-enabled Schedulers. In *Proceedings of the Thirty-third ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*, pages 1–12, November 2020. Acceptance Ratio: 68/380 = 18%. **Best Paper Award Finalist** and **Best Student Paper Award Finalist**.
57. **Noman Bashir**, David Irwin, and Prashant Shenoy. DeepSnow: Modeling the Impact of Snow on Solar Generation. In *Proceedings of the Seventh ACM International Conference on Systems For Energy-Efficient Buildings, Cities, and Transportation (BuildSys)*, pages 1–10, November 2020. Acceptance Ratio: 38/108 = 35%.
58. John Wamburu, Christopher Raff, David Irwin, and Prashant Shenoy. Greening Electric Bike Sharing Using Solar Charging Stations. In *Proceedings of the Seventh ACM International Conference on Systems For Energy-Efficient Buildings, Cities, and Transportation (BuildSys)*, pages 1–10, August 2020. Acceptance Ratio: 38/108 = 35%.
59. **Akansha Singh Bansal** and David Irwin. See the Light: Modeling Solar Performance using Multispectral Satellite Data. In *Proceedings of the Seventh ACM International Conference on Systems For Energy-Efficient Buildings, Cities, and Transportation (BuildSys)*, pages 1–10, August 2020. Acceptance Ratio: 38/108 = 35%.
60. **Akansha Singh Bansal** and David Irwin. Exploiting Satellite Data for Solar Performance Modeling. In *Proceedings of the IEEE International Conference on Smart Grid Communications (SmartGridComm)*, pages 1–8, October 2020.
61. Qianlin Liang, Prashant Shenoy, and David Irwin. AI on the Edge: Running AI-based IoT Applications Using Specialized Edge Architectures. In *Proceedings of the Sixteenth IEEE International Symposium on Workload Characterization (IISWC)*, pages 1–13, October 2020. Acceptance Ratio: 26/70 = 37%.
62. **Noman Bashir**, David Irwin, and Prashant Shenoy. A Probabilistic Approach to Committing Solar Energy in Day-ahead Electricity Markets. In *Proceedings of the Eleventh IEEE International Green and Sustainable Computing Conference (IGSC)*, pages 1–15, October 2020. Acceptance Ratio: 33%.
63. Amee Trivedi, Phuthipong Bovorkeeratiroj, Joe Breda, Prashant Shenoy, Jay Taneja, and David Irwin. Phone-based Ambient Temperature Sensing Using Opportunistic Crowdsensing and Machine Learning. In *Proceedings of the Eleventh IEEE International Green and Sustainable Computing Conference (IGSC)*, pages 1–15, June 2020. Acceptance Ratio: 33%. **Best Paper Award**.

64. Santiago Correa, **Noman Bashir**, Andrew Tan, David Irwin, and Jay Taneja. Extend: A Framework for Increasing Energy Access by Interconnecting Solar Home Systems. In *Proceedings of the Third ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS)*, pages 1–9, Guayaquil, Ecuador, June 2020. Acceptance Ratio: 26/84 = 31%.

65. Rishikesh Jha, Stephen Lee, Srinivasan Iyengar, Mohammad Hajiesmaili, Prashant Shenoy, and David Irwin. Emission-aware Energy Storage Scheduling for a Greener Grid. In *Proceedings of the Ninth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–11, Melbourne, Australia, June 2020. Acceptance Ratio: 25/88 = 28%. **Best Paper Award Runner-up**.

66. Phuthipong Bovornkeeratiroj, Srinivasan Iyengar, Stephen Lee, David Irwin, and Prashant Shenoy. RepEL: A Utility-preserving Privacy System for IoT-based Energy Meters. In *Proceedings of the Fifth ACM/IEEE Conference on Internet of Things Design and Implementation (IoTDI)*, pages 1–12, Melbourne, Australia, April 2020. Acceptance Ratio: 24/68 = 35%.

67. Joseph Breda, Amee Trivedi, Chulabhaya Wijesundara, Phuthipong Bovorkeeratiroj, David Irwin, Prashant Shenoy, and Jay Taneja. Hot or Not: Leveraging Mobile Devices for Ubiquitous Temperature Sensing. In *Proceedings of the Sixth ACM International Conference on Systems For Energy-Efficient Buildings, Cities, and Transportation (BuildSys)*, pages 1–10, New York City, New York, November 2019. Acceptance Ratio: 38/131 = 29%.

68. **Akansha Singh Bansal** and David Irwin. On the Feasibility, Cost, and Carbon Emissions of Grid Defection. In *Proceedings of the IEEE International Conference on Smart Grid Communications (SmartGridComm)*, pages 1–7, Beijing, China, November 2019.

69. **Pradeep Ambati** and David Irwin. Optimizing the Cost of Executing Mixed Interactive and Batch Workloads on Transient VMs. In *ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)*, pages 1–14, Phoenix, Arizona, June 2019. Acceptance Ratio (Winter Deadline): 23/127 = 18%.

70. Guoyi Zhao, Lixin Gao, and David Irwin. Sync-on-the-fly: A Parallel Framework for Gradient Descend Algorithms on Transient Resources. In *Proceedings of teh IEEE International Conference on Big Data (BigData)*, pages 1–10, December 2018. Acceptance Ratio: 103/518 = 20%.

71. **Supreeth Shastri** and David Irwin. Cloud Index Tracking: Enabling Predictable Costs in Cloud Spot Markets. In *Proceedings of the Ninth ACM Symposium on Cloud Computing (SoCC)*, pages 1–13, Carlsbad, California, October 2018. Acceptance Ratio: 39/160 = 24.4%.

72. **Noman Bashir**, David Irwin, and Prashant Shenoy. Helios: A Programmable Software-defined Solar Module. In *Proceedings of the Fifth ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 1–10, November 2018. Acceptance Ratio: 14/40 = 35%.

73. **Dong Chen**, **Joseph Breda**, and David Irwin. Staring at the Sun: A Physical Black-box Solar Performance Model. In *Proceedings of the Fifth ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 1–10, November 2018. Acceptance Ratio: 14/40 = 35%.

74. Srinivasan Iyengar, Stephen Lee, David Irwin, Prashant Shenoy, and Benjamin Weil. WattHome: A Data-driven Approach for Energy Efficiency Analytics at City-scale. In *Proceedings of the Twenty-fourth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)*, London, United Kingdom, August 2018. Acceptance Ratio: 40/496 = 8%.

75. John Wamburu, Stephen Lee, Prashant Shenoy, and David Irwin. Analyzing Distribution Transformers at City Scale and the Impact of EVs and Storage. In *Proceedings of the Eighth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–11, Karlsruhe, Germany, June 2018. Acceptance Ratio: 20/91 = 22%.

76. **Dong Chen**, Phuthipong Bovornkeeratiroj, David Irwin, and Prashant Shenoy. Private Memoirs of IoT Devices: Safeguarding User Privacy in the IoT Era. In *Proceedings of the Thirty-eighth IEEE International Conference on Distributed Computing Systems (ICDCS)*, pages 1–9, Vienna, Austria, June 2018.

77. **Dong Chen** and David Irwin. Weatherman: Exposing Weather-based Privacy Threats in Big Energy Data. In *Proceedings of teh IEEE International Conference on Big Data (BigData)*, pages 1–8, December 2017. Acceptance Ratio: 87/437 = 20%.

78. **Noman Bashir**, David Irwin, Prashant Shenoy, and Jay Taneja. Enforcing Fair Grid Energy Access for Controllable Distributed Solar Capacity. In *Proceedings of the Fourth ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 1–10, Delft, The Netherlands, November 2017. Acceptance Ratio: 30/96 = 31%. **Nominated for Best Paper Award**.

79. **Supreeth Shastri** and David Irwin. HotSpot: Automated VM Hopping in Cloud Spot Markets. In *Proceedings of the Eigth ACM Symposium on Cloud Computing (SoCC)*, pages 1–13, Santa Clara, California, September 2017. Acceptance Ratio: 48/203 = 23.6%.

80. Prateek Sharma, David Irwin, and Prashant Shenoy. Portfolio-driven Resource Management for Transient Cloud Servers. In *ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)*, pages 1–14, Urbana-Champaign, Illinois, June 2017. Acceptance Ratio: 27/203 = 13%.

81. **Dong Chen** and David Irwin. SunDance: Black-box Behind-the-Meter Solar Disaggregation. In *Proceedings of the Seventh ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–11, Hong Kong, May 2017. Acceptance Ratio: 18/72 = 25%.

82. Amee Trivedi, Prashant Shenoy, Deepak Ganesan, and David Irwin. iSchedule: Campus-scale HVAC Schedule via Mobile WiFi Monitoring. In *Proceedings of the Seventh ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–11, Hong Kong, May 2017. Acceptance Ratio: 18/72 = 25%.

83. Stephen Lee, Srinivasan Iyengar, David Irwin, and Prashant Shenoy. Distributed Rate Control for Smart Solar-powered Systems. In *Proceedings of the Seventh ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–11, Hong Kong, May 2017. Acceptance Ratio: 18/72 = 25%.

84. **Akansha Singh**, Stephen Lee, David Irwin, and Prashant Shenoy. SunShade: Enabling Software-defined Solar-powered Systems. In *Proceedings of the ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)*, pages 1–10, Pittsburgh, PA, April 2017.

85. **Supreeth Shastri**, Amr Rizk, and David Irwin. Transient Guarantees: Maximizing the Value of Idle Cloud Capacity. In *Proceedings of the Twenty-ninth ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*, pages 1–11, Salt Lake City, Utah, November 2016. Acceptance Ratio: 82/446 = 18%.

86. **Dong Chen**, Srinivasan Iyengar, David Irwin, and Prashant Shenoy. SunSpot: Exposing the Location of Anonymous Solar-powered Homes. In *Proceedings of the Third ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 85–94, Stanford, California, November 2016. Acceptance Ratio: 19/98 = 24%.

87. Srinivasan Iyengar, Stephen Lee, David Irwin, and Prashant Shenoy. Analyzing Energy Usage on a City-scale using Utility Smart Meters. In *Proceedings of the Third ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 51–60, Stanford, California, June 2016. Acceptance Ratio: 19/98 = 24%.

88. **Dong Chen**, David Irwin, and Prashant Shenoy. SmartSim: A Device-Accurate Smart Home Energy Trace Generator. In *Proceedings of the IEEE International Conference on Smart Grid Communications (SmartGridComm)*, pages 1–7, Sydney, Australia, November 2016.

89. **Pradeep Ambati** and David Irwin. AutoPlug: An Automated Metadata Service for Smart Outlets. In *Proceedings of the Seventh IEEE International Green and Sustainable Computing Conference (IGSC)*, pages 1–8, Hangzhou, China, November 2016.

90. Stephen Lee, Srinivasan Iyengar, Prashant Shenoy, and David Irwin. Shared Solar-powered EV Charging Stations: Feasibility and Benefits. In *Proceedings of the Seventh IEEE International Green and Sustainable Computing Conference (IGSC)*, pages 1–8, Hangzhou, China, November 2016.

91. Srinivasan Iyengar, David Irwin, and Prashant Shenoy. Non-Intrusive Model Detection: Automated Modeling of Residential Electrical Loads. In *Proceedings of the Sixth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–11, Waterloo, Canada, June 2016. Acceptance Ratio: 22/73 = 30%.

92. **Xue Ouyang**, David Irwin, and Prashant Shenoy. SpotLight: An Information Service for the Cloud. In *Proceedings of the Thirty-sixth IEEE International Conference on Distributed Computing Systems (ICDCS)*, pages 1–12, Nara, Japan, June 2016. Acceptance Ratio: 68/386 = 18%.

93. Prateek Sharma, Tian Guo, Xin He, David Irwin, and Prashant Shenoy. Flint: Batch-Interactive Data-Intensive Processing for Transient Servers. In *Proceedings of the Eleventh ACM European Conference on Computer Systems (EuroSys)*, pages 1–15, London, United Kingdom, April 2016. Acceptance Ratio: 38/180 = 21%.

94. **Supreeth Subramanya**, **Zain Mustafa**, David Irwin, and Prashant Shenoy. Beyond Energy-Efficiency: Evaluating Green Datacenter Applications for Energy-agility. In *Proceedings of the Seventh ACM/SPEC International Conference on Performance Engineering (ICPE)*, pages 1–12, Delft, Netherlands, March 2016. Acceptance Ratio: 19/57 = 33%.

95. Patrick Pegus II, Benoy Varghese, Tian Guo, David Irwin, Prashant Shenoy, Anirban Mahanti, James Culbert, John Goodhue, and Chris Hill. Analyzing the Efficiency of a Green University Data Center. In *Proceedings of the Seventh ACM/SPEC International Conference on Performance Engineering (ICPE)*, pages 1–11, Delft, Netherlands, March 2016. Acceptance Ratio: 19/57 = 33%.

96. Srinivasan Iyengar, Sandeep Kalra, Anushree Ghosh, David Irwin, Prashant Shenoy, and Benjamin Marlin. iProgram: Inferring Smart Schedules for Dumb Thermostats. In *Proceedings of the Second ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 1–10, Seoul, South Korea, November 2015. Acceptance Ratio: 25/84 = 30%.

97. Cong Wang, Michael Zink, and David Irwin. Optimizing Parallel HPC Applications for Green Energy Sources. In *Proceedings of the Sixth IEEE International Green and Sustainable Computing Conference (IGSC)*, pages 1–8, Las Vegas, Nevada, December 2015. Acceptance Ratio: 24/67 = 36%.

98. **Supreeth Subramanya**, Tian Guo, Prateek Sharma, David Irwin, and Prashant Shenoy. SpotOn: A Batch Computing Service for the Spot Market. In *Proceedings of the Sixth ACM Symposium on Cloud Computing (SoCC)*, pages 1–13, Kohala Coast, Hawai'i, August 2015. Acceptance Ratio: 34/157 = 22%.

99. Aditya Mishra, Ramesh Sitaraman, David Irwin, and Ting Zhu. Integrating Energy Storage in Electricity Distribution Networks. In *Proceedings of the Fifth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–10, Bangalore, India, July 2015. Acceptance Ratio: 16/70 = 23%.

100. Xin He, Ramesh Sitaraman, Prashant Shenoy, and David Irwin. Cutting the Cost of Hosting Online Services Using Cloud Spot Markets. In *Proceedings of the Twenty-fourth International ACM Symposium on High Performance Distributed Computing (HPDC)*, pages 1–12, Portland, Oregon, June 2015. Acceptance Ratio: 19/116 = 16%.

101. Prateek Sharma, Stephen Lee, Tian Guo, David Irwin, and Prashant Shenoy. SpotCheck: Designing a Derivative Cloud on the Spot Market. In *Proceedings of the Tenth ACM European Conference on Computer Systems (EuroSys)*, pages 1–15, Bordeaux, France, April 2015. Acceptance Ratio: 32/150 = 21%.

102. **Sean Barker**, Sandeep Kalra, David Irwin, and Prashant Shenoy. PowerPlay: Creating Virtual Power Meters through Online Load Tracking in Smart Homes. In *Proceedings of the First ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 1–10, Memphis, Tennessee, July 2014. Acceptance Ratio: 15/59 = 25%. **Best Paper Award Runner-up**.

103. Srinivasan Iyengar, Navin Sharma, David Irwin, Prashant Shenoy, and Krithi Ramamkritham. SolarCast - A Cloud-based Black Box Solar Predictor for Smart Homes. In *Proceedings of the First ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 1–10, Memphis, Tennessee, July 2014. Acceptance Ratio: 15/59 = 25%.

104. Zhichuan Huang, Jikui Su, Ting Zhu, Ankur Sharma, Ameya Ambegaonkar, Yu Gu, Aditya Mishra, David Irwin, and Prashant Shenoy. Minimizing Electricity Costs by Sharing Energy in Sustainable Microgrids. In *Proceedings of the First ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 1–10, Memphis, Tennessee, July 2014. Acceptance Ratio: 15/59 = 25%. **Best Paper Award Runner-up**.

105. **Sean Barker**, Mohamed Musthag, David Irwin, and Prashant Shenoy. Non-Intrusive Load Identification for Smart Outlets. In *Proceedings of the Fifth IEEE International Conference on Smart Grid Communications (SmartGridComm)*, pages 1–6, Venice, Italy, November 2014. Acceptance Ratio: 166/399 = 42%.

106. **Dong Chen**, David Irwin, Prashant Shenoy, and Jeannie Albrecht. Combined Heat and Privacy: Preventing Occupancy Detection from Smart Meters. In *Proceedings of the Twelfth IEEE International Conference on Pervasive Computing and Communications (PerCom)*, pages 208–215, Budapest, Hungary, March 2014. Acceptance Ratio: 25/175 = 14%.

107. **Sean Barker**, Sandeep Kalra, David Irwin, and Prashant Shenoy. Empirical Characterization and Modeling of Electrical Loads in Smart Homes. In *Proceedings of the Fourth IEEE International Green Computing Conference (IGCC)*, pages 1–10, Washington, D.C., June 2013. Acceptance Ratio: 16/65 = 24%.

108. Navin Sharma, David Irwin, and Prashant Shenoy. A Distributed File System for Intermittent Power. In *Proceedings of the Fourth IEEE International Green Computing Conference (IGCC)*, pages 1–10, Washington, D.C., June 2013. Acceptance Ratio: 16/65 = 24%.

109. Aditya Mishra, David Irwin, Prashant Shenoy, and Ting Zhu. Scaling Distributed Energy Storage for Grid Peak Reduction. In *Proceedings of the Fourth ACM International Conference on Future Energy Systems (e-Energy)*, pages 3–14, Berkeley, California, May 2013. Acceptance Ratio: 22/76 = 29%. **Best Paper Award Runner-up**.

110. Ting Zhu, Zhichuan Huang, Ankur Sharma, Jikui Su, David Irwin, Aditya Mishra, Daniel Menasche, and Prashant Shenoy. Sharing Renewable Energy in Smart Microgrids. In *Proceedings of the Fourth ACM/IEEE Conference on Cyber-Physical Systems (ICCPS)*, pages 219–228, Philadelphia, Pennsylvania, April 2013. Acceptance Ratio: 24/103 = 23%.

111. Rahul Singh, David Irwin, Prashant Shenoy, and K.K. Ramakrishnan. Yank: Enabling Green Data Centers to Pull the Plug. In *Proceedings of the Tenth USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, pages 143–155, Lombard, Illinois, April 2013. Acceptance Raio: 38/171 = 22%.

112. Navin Sharma, Dilip Kumar Krishnappa, David Irwin, Michael Zink, and Prashant Shenoy. GreenCache: Augmenting Off-the-Grid Cellular Towers with Multimedia Caches. In *Proceedings of the Fourth ACM Multimedia Systems Conference (MMSys)*, pages 271–280, Oslo, Norway, February 2013. Acceptance Ratio: 15/63 = 24%.

113. Dilip Kumar Krishnappa, Eric Lyons, David Irwin, and Michael Zink. CloudCast: Cloud Computing for Short-term Mobile Weather Forecasts. In *Proceedings of the Thirty-first IEEE International Performance Computing and Communications Conference (IPCCC)*, pages 61–70, Austin, Texas, December 2012. Acceptance Ratio: 32/115 = 28%.

114. Dilip Kumar Krishnappa, Eric Lyons, David Irwin, and Michael Zink. Network Capabilities of Cloud Services for a Real Time Scientific Application. In *Proceedings of the Thirty-Seventh IEEE Conference on Local Area Networks (LCN)*, pages 487–495, Clearwater, Florida, October 2012. Acceptance Ratio: 52/174 = 30%.

115. Aditya Mishra, David Irwin, Prashant Shenoy, Jim Kurose, and Ting Zhu. SmartCharge: Cutting the Electricity Bill in Smart Homes with Energy Storage. In *Proceedings of the Third ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–11, Madrid, Spain, May 2012. Acceptance Ratio: 22/63 = 35%.

116. **Sean Barker**, Aditya Mishra, David Irwin, Prashant Shenoy, and Jeannie Albrecht. SmartCap: Flattening Peak Electricity Demand in Smart Homes. In *Proceedings of the Tenth IEEE International Conference on Pervasive Computing and Communications (PerCom)*, pages 67–75, Lugano, Switzerland, March 2012. Acceptance Ratio: 16/150 = 11%. **Appears in Best Papers Session**.

117. Andrés Molina-Markham, George Danezis, Kevin Fu, Prashant Shenoy, and David Irwin. Designing Privacy-preserving Smart Meters with Low-cost Microcontrollers. In *Proceedings of the Sixteenth International Conference on Financial Cryptography and Data Security (FC)*, pages 239–253, Bonaire, February 2012. Acceptance Ratio: 23/88 = 26%.

118. Navin Sharma, Pranshu Sharma, David Irwin, and Prashant Shenoy. Predicting Solar Generation from Weather Forecasts Using Machine Learning. In *Proceedings of the Second IEEE International Conference on Smart Grid Communications (SmartGridComm)*, pages 528–533, Brussels, Belgium, October 2011. Acceptance Ratio: 105/265 = 40%.

119. Navin Sharma, **Sean Barker**, David Irwin, and Prashant Shenoy. Blink: Managing Server Clusters on Intermittent Power. In *Proceedings of the Sixteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, pages 185–198, Newport Beach, California, March 2011. Acceptance Ratio: 32/152 = 21%.

120. Navin Sharma, David Irwin, Prashant Shenoy, and Michael Zink. MultiSense: Fine-grained Multiplexing for Steerable Camera Sensor Networks. In *Proceedings of the Second ACM Multimedia Systems Conference (MMSys)*, pages 23–34, San Jose, California, February 2011. Acceptance Ratio: 15/41 = 37%.

121. Navin Sharma, Jeremy Gummeson, David Irwin, and Prashant Shenoy. Cloudy Computing: Leveraging Weather Forecasts in Energy Harvesting Sensor Systems. In *Proceedings of the Seventh Annual IEEE Communications Society Conference on Sensor, Mesh, and Ad Hoc Communications and Networks (SECON)*, pages 136–144, Boston, Massachusetts, June 2010. Acceptance Ratio: 63/268 = 23%.

122. Bo An, Victor Lesser, David Irwin, and Michael Zink. Automated Negotiation with Decommitment for Dynamic Resource Allocation in Cloud Computing. In *Proceedings of the Ninth International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 981–988, Toronto, Canada, May 2010. Acceptance Ratio: 163/685 = 24%.

123. David Irwin, Navin Sharma, Michael Zink, and Prashant Shenoy. Towards a Virtualized Sensing Environment. In *Proceedings of the Sixth International Conference on Testbeds and Research Infrastructures for the Development of Networks and Communities (TridentCom)*, pages 133–142, Berlin, Germany, May 2010. Acceptance Ratio: 15%.

124. Navin Sharma, Jeremy Gummeson, David Irwin, and Prashant J. Shenoy. SRCP: Simple Remote Control for Perpetual High-power Sensor Networks. In *Proceedings of the Sixth European Conference on Wireless Sensor Networks (EWSN)*, pages 358–374, Cork, Ireland, February 2009. Acceptance Ratio: 23/145 = 16%.

125. Jeff Chase, Laura Grit, David Irwin, Varun Marupadi, Piyush Shivam, and Aydan Yumerefendi. Beyond Virtual Data Centers: Toward an Open Resource Control Architecture. In *Proceedings of the First International Conference on the Virtual Computing Initiative (ICVCI)*, pages 1–10, Research Triangle Park, North Carolina, May 2007

126. Lavanya Ramakrishnan, Laura Grit, Adriana Iamanitchi, David Irwin, Aydan Yumerefendi, and Jeff Chase. Toward a Doctrine of Containment: Grid Hosting with Adaptive Resource Control. In *Proceedings of the Nineteenth ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*, pages 1–12, Tampa, Florida, November 2006. Acceptance Ratio: 54/239 = 23%.

127. David Irwin, Jeff Chase, Laura Grit, Aydan Yumerefendi, David Becker, and Kenneth G. Yocum. Sharing Networked Resources with Brokered Leases. In *Proceedings of the USENIX Annual Technical Conference (USENIX)*, pages 199–212, Boston, Massachusetts, June 2006. Acceptance Ratio: 21/153 = 14%.

128. Parthasarathy Ranganathan, Phil Leech, David Irwin, and Jeffrey Chase. Ensemble-level Power Management for Dense Blade Servers. In *Proceedings of the Thirty-third Annual International Symposium on Computer Architecture (ISCA)*, pages 66–77, Boston, Massachusetts, June 2006. Acceptance Ratio: 31/234 = 13%.

129. David E. Irwin, Laura E. Grit, and Jeffrey S. Chase. Balancing Risk and Reward in a Market-based Task Service. In *Proceedings of the Thirteenth Annual Symposium on High Performance Distributed Computing (HPDC)*, pages 160–169, Honolulu, Hawaii, June 2004. Acceptance Ratio: 24/153 = 16%.

130. Jeffrey S. Chase, David E. Irwin, Laura E. Grit, Justin D. Moore, and Sara E. Sprenkle. Dynamic Virtual Clusters in a Grid Site Manager. In *Proceedings of the Twelfth Annual Symposium on High Performance Distributed Computing (HPDC)*, pages 90–100, Seattle, Washington, June 2003. Acceptance Ratio: 25/121 = 21%. **Selected as one of the best papers at HPDC from 1992-2012**.

WORKSHOP PROCEEDINGS

Works in this category are refereed workshop publications. Acceptance rates listed where known.

131. Phuthipong Bovornkeeratiroj, **Noman Bashir**, Vivek Deulkar, Bharathan Balaji, Prashant Shenoy, David Irwin, and Mohammad Hajiesmaili. Quantifying the Decarbonization Potential of Flexible Loads. In *Proceedings of the ACM International Workshop on Cyber-Physical-Social Infrastructure Systems (CPSIS)*, Istanbul, Turkey, November 2023.

132. **Noman Bashir**, David Irwin, and Prashant Shenoy. On the Promise and Pitfalls of Optimizing Embodied Carbon. In *Proceedings of the Second SIGEnergy Workshop on Sustainable Computer Systems (HotCarbon)*, Boston, Massachusetts, July 2023.

133. Walid A. Hanafy, Roozbeh Bostandoost, **Noman Bashir**, David Irwin, Mohammad Hajiesmaili, and Prashant Shenoy. The war of the efficiencies: Understanding the tension between carbon and energy optimization. In *Proceedings of the Second SIGEnergy Workshop on Sustainable Computer Systems (HotCarbon)*, Boston, Massachusetts, July 2023.

134. **Noman Bashir**, David Irwin, Prashant Shenoy, and Abel Souza. Sustainable Computing - Without the Hot Air. In *Proceedings of the First Workshop on Sustainable Computer Systems Design and Implementation (HotCarbon)*, pages 1–7, San Diego, California, July 2022.

135. John Wamburu, Emma Grazier, David Irwin, Christine Crago, and Prashant Shenoy. Towards Equity in Energy Efficiency Analyses. In *Proceedings of the First ACM SIGEnergy Workshop on Fair, Accountable, Transparent, and Ethical AI for Smart Environments and Energy Systems (FATESys)*, pages 1–5, Coimbra, Portugal, November 2021.

136. **Pradeep Ambati**, David Irwin, and Prashant Shenoy. No Reservations: A First Look at Amazon's Reserved Instance Marketplace. In *Proceedings of the Twelfth USENIX Workshop on Hot Topics in Cloud Computing (HotCloud)*, pages 1–6, Boston, Massachusetts, July 2020. Acceptance Ratio: 22/95 = 23%.

137. **Supreeth Shastri** and David Irwin. Towards Index-based Global Trading in Cloud Spot Markets. In *Proceedings of the Ninth USENIX Workshop on Hot Topics in Cloud Computing (HotCloud)*, pages 1–6, Santa Clara, California, July 2017. Acceptance Ratio: 19/58 = 33%.

138. **Dong Chen** and David Irwin. Black-box Solar Performance Modeling: Comparing Physical, Machine Learning, and Hybrid Approaches. In *Proceedings of the ACM Greenmetrics Workshop (Greenmetrics)*, pages 1–6, June 2017.

139. **Supreeth Subramanya**, Amr Rizk, and David Irwin. Cloud Spot Markets are Not Sustainable: The Case for Transient Guarantees. In *Proceedings of the Eighth USENIX Workshop on Hot Topics in Cloud Computing (HotCloud)*, pages 1–6, Denver, Colorado, June 2016. Acceptance Ratio: 21/68 = 31%.

140. Prateek Sharma, David Irwin, and Prashant Shenoy. How Not to Bid the Cloud. In *Proceedings of the Eighth USENIX Workshop on Hot Topics in Cloud Computing (HotCloud)*, pages 1–6, Denver, Colorado, June 2016. Acceptance Ratio: 21/68 = 31%.

141. **Supreeth Subramanya**, **Zain Mustafa**, David Irwin, and Prashant Shenoy. Energy-Agility: A New Grid-centric Metric for Evaluating System Performance. In *Proceedings of the First Workshop on Computing within Limits (LIMITS)*, pages 1–5, Irvine, California, June 2015.

142. **Sean Barker**, Sandeep Kalra, David Irwin, and Prashant Shenoy. NILM Redux: The Case for Emphasizing Applications over Accuracy. In *Proceedings of the Second International Workshop on Non-Intrusive Load Monitoring (NILM)*, pages 1–4, Austin, Texas, June 2014.

143. **Dong Chen**, **Sean Barker**, Adarsh Subbaswamy, David Irwin, and Prashant Shenoy. Non-intrusive Occupancy Monitoring using Smart Meters. In *Proceedings of the Fifth ACM Workshop On Embedded Sensing Systems For Energy-Efficiency In Buildings (BuildSys)*, pages 1–8, Rome, Italy, November 2013. Acceptance Ratio: 22/57 = 39%.

144. Ye Xu, David Irwin, and Prashant Shenoy. Incentivizing Advanced Load Scheduling in Smart Homes. In *Proceedings of the Fifth ACM Workshop On Embedded Sensing Systems For Energy-Efficiency In Buildings (BuildSys)*, pages 1–8, Rome, Italy, November 2013. Acceptance Ratio: 22/57 = 39%.

145. **Sean Barker**, Aditya Mishra, David Irwin, Emmanuel Cecchet, Prashant Shenoy, and Jeannie Albrecht. Smart*: An Open Data Set and Tools for Enabling Research in Sustainable Homes. In *Proceedings of the Second Workshop on Data Mining Applications for Sustainability (SustKDD)*, pages 1–6, Beijing, China, August 2012.

146. David Irwin, Anthony Wu, **Sean Barker**, Aditya Mishra, Prashant Shenoy, and Jeannie Albrecht. Exploiting Home Automation Protocols for Load Monitoring in Smart Buildings. In *Proceedings of the Third ACM Workshop On Embedded Sensing Systems For Energy-Efficiency In Buildings (BuildSys)*, pages 7–12, Seattle, Washington, November 2011. Acceptance Ratio: 10/29 = 35%.

147. Ting Zhu, Aditya Mishra, David Irwin, Navin Sharma, Don Towsley, and Prashant Sheony. The Case for Efficient Renewable Energy Management for Smart Homes. In *Proceedings of the Third ACM Workshop On Embedded Sensing Systems For Energy-Efficiency In Buildings (BuildSys)*, pages 67–72, Seattle, Washington, November 2011. Acceptance Ratio: 10/29 = 34.5%.

148. David Irwin, Navin Sharma, and Prashant Shenoy. Towards Continuous Policy-driven Demand Response in Data Centers. In *Proceedings of the SIGCOMM Workshop on Energy and IT: from Green Networking to Smarter Systems (GreenNets)*, pages 19–24, Toronto, Canada, August 2011. Acceptance Ratio: 8/19 = 42%. **Best Paper Award**.

149. Ville Satopää, Jeannie Albrecht, David Irwin, and Barath Raghavan. Finding a 'Kneedle' in a Haystack: Detecting Knee Points in System Behavior. In *Proceedings of the Third ICDCS Workshop on Simplifying Complex Networks for Practitioners (Simplex)*, pages 166–171, Minneapolis, Minnesota, June 2011.

150. Ilia Baldine, Yufeng Xin, Anirban Mandal, Chris Heermann, Jeffrey Chase, Varun Marupadi, Aydan Yumerefendi, and David Irwin. Networked Cloud Orchestration: A GENI Perspective. In *Proceedings of the Second IEEE Workshop on Management of Emerging Networks and Services (MENS)*, pages 573–578, Miami, Florida, December 2010.

151. Andrés Molina-Markham, Prashant Shenoy, Kevin Fu, Emmanuel Cecchet, and David Irwin. Private Memoirs of a Smart Meter. In *Proceedings of the Second ACM Workshop On Embedded Sensing Systems For Energy-Efficiency In Buildings (BuildSys)*, pages 61–66, Zürich, Switzerland, November 2010. Acceptance Ratio: 14/40 = 35%.

152. Aydan Yumerefendi, Piyush Shivam, David Irwin, Pradeep Gunda, Laura Grit, Azbayar Demberel, Jeff Chase, and Shivnath Babu. Towards an Autonomic Computing Testbed. In *Proceedings of the Second Workshop on Hot Topics in Autonomic Computing (HotAcII)*, pages 1–5, Jacksonville, Florida, June 2007. Acceptance Ratio: 5/17 = 29%.

153. Laura Grit, David Irwin, Varun Marupadi, Piyush Shivam, Aydan Yumerefendi, Jeff Chase, and Jeannie Albrecht. Harnessing Virtual Machine Resource Control for Job Management. In *Proceedings of the First Workshop on System-level Virtualization for High Performance Computing (HPCVirt)*, pages 1–8, Lisbon, Portugal, March 2007.

154. Laura Grit, David Irwin, Aydan Yumerefendi, and Jeff Chase. Virtual Machine Hosting for Networked Clusters: Building the Foundations for "Autonomic" Orchestration. In *Proceedings of the First International Workshop on Virtualization Technology in Distributed Computing (VTDC)*, pages 1–8, Tampa, Florida, November 2006.

155. David Irwin, Jeff Chase, Laura Grit, and Aydan Yumerefendi. Self-Recharging Virtual Currency. In *Proceedings of the Third SIGCOMM Workshop on Economics of Peer-to-Peer Systems (ECONP2P)*, pages 93–98, Philadephia, Pennslyvania, August 2005. Acceptance Ratio: 11/38 = 29%.

OTHER PUBLICATIONS

Works in this category are publications reporting on other significant research activities, including refereed conference note and short papers (4-6 pages), refereed conference talk, poster and demonstration abstracts (2 pages), invited conference, journal, and technical magazine articles, and technical reports.

156. Parthasarathy Ranganthan, Phil Leech, David Irwin, and Jeff Chase. RETROSPECTIVE: Ensemble-level Power Management for Dense Blade Servers. In *ISCA@50 Retrospective: 1996-2020. Edited by José F. Martínez and Lizy K. John*, pages 1–2, June 2023. **Selected for inclusion in ISCA@50 25-year Retrospective 1996-2020**.

157. Anupama Sitaraman, **Noman Bashir**, David Irwin, and Prashant Shenoy. Leveraging Solar PV and Storage for Deep Decarbonization of Residential Heating Systems. In *Proceedings of the Thirteenth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–2, Orlando, Florida, June 2023. **Poster Paper**.

158. **Thanathorn Sukprasert**, Abel Souza, **Noman Bashir**, David Irwin, and Prashant Shenoy. Spatiotemporal Carbon-Aware Scheduling in the Clouds: Limits and Benefits. In *Proceedings of the Thirteenth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–2, Orlando, Florida, June 2023. **Poster Paper**.

159. **Noman Bashir**, Abel Souza, David Irwin, and Prashant Shenoy. Benefits and Limitations of Carbon Accounting Paradigms. In *First Workshop on NetZero Carbon Computing (NetZero) co-located with IEEE Symposium on High-Performance Computer Architecture (HPCA)*, pages 1–2, Montreal, Canada, February 2023. **Abstract Paper**.

160. John Wamburu, Emma Grazier, David Irwin, Christine Crago, and Prashant Shenoy. Data-driven Decarbonization of Residential Heating Systems: An Equity Perspective. pages 1–2, June 2022. **Poster Abstract**.

161. Michael Zink, David Irwin, Emmanuel Cecchet, Hakan Saplakoglu, Orran Krieger, Martin Herbordt, Michael Daitzman, Peter Desnoyers, Miriam Leeser, and Suranga Handagala. The Open Cloud Testbed (OCT): A Platform for Research into New Cloud Technologies. In *Proceedings of the IEEE International Conference on Cloud Networking (CloudNet)*, pages 1–8, November 2021. **Invited Paper**.

162. **Akansha Singh Bansal**, Trapit Bansal, and David Irwin. Self-Supervised Learning on Multispectral Satellite Data for Near-Term Solar Forecasting. In *ICML Workshop on Tackling Climate Change with Machine Learning*, July 2021. **Poster Abstract**.

163. Menghong Feng, **Noman Bashir**, Prashant Shenoy, David Irwin, and Dragoljub Kosanovic. SunDown: Model-driven Per-Panel Solar Anomaly Detection for Residential Arrays. In *Proceedings of the Third ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS)*, pages 1–5, Guayaquil, Ecuador, June 2020. **Note Paper**. Acceptance Ratio: 34/84 = 40%.

164. Akhil Soman, Amee Trivedi, David Irwin, Beka Kosanovic, and Prashant Shenoy. Peak Forecasting for Battery-based Energy Optimizations in Campus Microgrids. In *Proceedings of the Ninth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–5, Melbourne, Australia, June 2020. **Note Paper.** Acceptance Ratio: 10/37 = 27%.

165. **Pradeep Ambati**, **Noman Bashir**, David Irwin, Prashant Shenoy, and Mohammad Hajiesmaili. Hedge your Bets: Optimizing Long-term Cloud Costs by Mixing VM Purchasing Options. In *IEEE International Conference on Cloud Engineering (IC2E)*, Melbourne, Australia, June 2020. **Invited Paper**.

166. **Noman Bashir**, **Dong Chen**, David Irwin, and Prashant Shenoy. Solar-TK: A Data-driven Toolkit for Solar PV Performance Modeling and Forecasting. In *Proceedings of the Sixteenth IEEE International Conference on Mobile Ad-Hoc and Smart Systems (MASS)*, pages 1–11, Monterey, California, November 2019. **Invited Paper**.

167. **Pradeep Ambati**, David Irwin, Prashant Shenoy, Lixin Gao, Ahmed Ali-Eldin, and Jeannie Albrecht. Understanding Synchronization Costs on Transient Cloud Resources. In *IEEE International Conference on Cloud Engineering (IC2E)*, pages 1–11, Prague, Czech Republic, June 2019. **Invited Paper**.

168. **Noman Bashir**, **Dong Chen**, David Irwin, and Prashant Shenoy. Solar-TK: A Tolkit for Solar PV Performance Modeling and Forecasting. In *Proceedings of the Sixth ACM International Conference on Systems For Energy-Efficient Buildings, Cities, and Transportation (BuildSys)*, pages 1–2, New York City, New York, November 2019. **Demo Abstract**.

169. David Irwin and Jeannie Albrecht. Smart Homes: Implemented. *IEEE Pervasive Computing*, 18(2):91–95, April-June 2019.

170. David Irwin, Prashant Shenoy, **Pradeep Ambati**, Prateek Sharma, and **Supreeth Shastri**. The Price is (Not) Right: Reflections on Pricing for Transient Cloud Servers. In *Proceedings of the Twenty-eighth IEEE International Conference on Computer Communications and Networks (ICCCN)*, pages 1–9, Valencia, Spain, July 2019. **Invited Paper**.

171. David Irwin and Bhuvan Urgaonkar. Research Challenges at the Intersection of Cloud Computing and Economics. Technical report, National Science Foundation, December 2018.

172. Stephen Lee, Prashant Shenoy, Krithi Ramamritham, and David Irwin. vSolar: Virtualizing Community Solar and Storage for Energy Sharing. In *Proceedings of the Eighth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–5, Karlsruhe, Germany, June 2018. **Note Paper**. Acceptance Ratio: 34/91 = 37%.

173. David Irwin, Prateek Sharma, **Supreeth Shastri**, and Prashant Shenoy. The Financialization of Cloud Computing: Opportunities and Challenges. In *Proceedings of the Twenty-sixth IEEE International Conference on Computer Communications and Networks (ICCCN)*, pages 1–11, Vancouver, Canada, July 2017. **Invited Paper**.

174. **Supreeth Shastri** and David Irwin. Automaton: Self-optimizing Cloud Servers. In *Proceedings of the Seventh ACM Symposium on Cloud Computing (SoCC)*, pages 1–2, Santa Clara, California, October 2016. **Poster Abstract**.

175. **Akansha Singh**, Stephen Lee, David Irwin, and Prashant Shenoy. SunShade: Software-defined Solar Systems. In *Proceedings of the Sixth ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–2, Waterloo, Canada, June 2016. **Poster Abstract**.

176. Srinivasan Iyengar, Sandeep Kalra, Anushree Ghosh, David Irwin, Prashant Shenoy, and Benjamin Marlin. iProgram: Inferring Smart Schedules for Dumb Thermostats. In *Proceedings of the Women in Machine Learning Workshop (WiML)*, pages 1–2, Montreal, Canada, December 2015. **Poster Abstract**.

177. **Supreeth Subramanya**, Tian Guo, Prateek Sharma, David Irwin, and Prashant Shenoy. SpotOn: A Batch Computing Service for the Spot Market. In *Proceedings of the Sixth ACM Symposium on Cloud Computing (SoCC)*, pages 1–2, Kohala Coast, Hawai'i, August 2015. **Poster Abstract**.

178. Srinivasan Iyengar, Navin Sharma, David Irwin, Prashant Shenoy, and Krithi Ramamkritham. SolarCast - An Open Web Service for Predicting Solar Power Generation in Smart Homes. In *Proceedings of the First ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, pages 1–2, Memphis, Tennessee, July 2014. **Demo Abstract**.

179. Dilip Kumar Krishnappa, Eric Lyons, David Irwin, and Michael Zink. Compute Cloud Based Weather Detection and Warning System. In *Proceedings of the IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, pages 2430–2433, Munich, Germany, July 2012. **Poster Abstract**.

180. Barath Raghavan, David Irwin, Jeannie Albrecht, Justin Ma, and Adam Streed. An Intermittent Energy Internet Architecture. In *Proceedings of the Third ACM International Conference on Future Energy Systems (e-Energy)*, pages 1–4, Madrid, Spain, May 2012. **Note Paper**. Acceptance Ratio: 7/22 = 32%.

181. David Irwin, Prashant Shenoy, Emmanuel Cecchet, and Michael Zink. Resource Management in Data-Intensive Clouds: Opportunities and Challenges. In *Proceedings of the Seventeenth IEEE Workshop on Local and Metropolitan Area Networks (LANMAN)*, pages 1–6, Long Branch, New Jersey, May 2010. **Invited Paper**.
182. Piyush Shivam, Azbayar Demberel, Pradeep Gunda, David Irwin, Laura Grit, Aydan Yumerefendi, Shivnath Babu, and Jeff Chase. Automated and On-Demand Provisioning of Virtual Machines for Database Applications. In *Proceedings of the Twenty-sixth ACM SIGMOD Conference on Management of Data (SIGMOD)*, pages 1079–1081, Beijing, China, June 2007. Acceptance Ratio: 35/95 = 36.8%. **Demo Paper**.
183. David Irwin, Jeff Chase, Laura Grit, Aydan Yumerefendi, and Jeannie Albrecht. Underware: An Exokernel for the Internet? Technical report, Duke University CS-2007-01, January 2007.
184. Laura Grit, David Irwin, Aydan Yumerefendi, and Jeff Chase. Shirako: Virtual Machine Hosting for Networked Clusters. In *Session Proceedings of the Seventh USENIX Symposium on Operating System Design and Implementation (OSDI)*, pages 1–2, Seattle, Washington, November 2006. **Poster Abstract**.
185. Justin Moore, David Irwin, Laura Grit, Sara Sprenkle, and Jeff Chase. Managing Mixed-Use Clusters with Cluster-on-Demand. Technical report, Duke University CS-2002-07, November 2002.

PRESENTATIONS

Conferences and Workshops

2020: "OpenStack on CloudLab Demo and Tutorial" at the Open Cloud Workshop
2018: "Helios: A Programmable Software-defined Solar Module" at BuildSys
2017: "The Financialization of Cloud Computing: Opportunities and Challenges" at ICCCN
2016: "Beyond Energy-efficiency: Evaluating Green Datacenter Applications for Energy-agility" at ICPE
2016: "Analyzing the Efficiency of a Green University Data Center" at ICPE
2014: "PowerPlay: Creating Virtual Power Meters for Smart Homes" at BuildSys
2013: "Incentivizing Advanced Load Scheduling in Smart Homes" at BuildSys
2013: "A Distributed File System for Intermittent Power" at IGCC
2012: "An Intermittent Energy Internet Architecture" at e-Energy
2011: "Towards Continuous Policy-driven Demand Response in Data Centers" at GreenNets
2010: "Cloudy Computing: Leveraging Weather Forecasts in Sensor Systems" at SECON
2010: "Towards a Virtualized Sensing Environment" at TridentCom
2006: "Sharing Networked Resources with Brokered Leases" at USENIX
2005: "Self-Recharging Virtual Currency" at ECONP2P
2004: "Balancing Risk and Reward in a Market-based Task Scheduler" at HPDC
2003: "Dynamic Virtual Clusters in a Grid Site Manager" at HPDC

Invited Talks

2023: "Introduction to the Energy System," UMass Turing Summer Program for High School Students"
2023: "Quantifying the Benefits of Spatiotemporal Workload Shifting in the Cloud"
2022: "Introduction to Cloud Computing," UMass Summer Engineering Institute for High School Students (SENGI)
2021: "Enabling Sustainable Clouds: The Case for Virtualizing the Energy System" at Microsoft Research
2020: "Introduction to Cloud Computing," UMass Summer Engineering Institute for High School Students (SENGI)
2019: "Staring at the Sun: Black-box Solar Energy Analytics and their Privacy Implications," Invited Keynote Talk at ACM Workshop on Energy Data and Analytics (EDA)
2018: "Staring at the Sun: Black-box Solar Energy Analytics and their Privacy Implications," Invited Talk, Department of Computing, Hong Kong Polytechnic University
2017: "Staring at the Sun: An Introduction to Solar Energy," UMass Summer Engineering Institute for High School Students (SENGI)
2017: "Staring at the Sun: Black-box Solar Energy Analytics and their Privacy Implications," Invited Keynote Talk at ACM Greenmetrics Workshop
2015: "Expect the Unexpected: Exploiting Transient Servers in Data Centers" at Duke University
2015: "Introduction to Computer Systems Engineering," UMass Summer Engineering Institute for High

School Students (SENGI)
2014: "Model-driven Energy Management for Smart Buildings" at MPE Data-aware Energy-use Workshop
2013: "Adventures in Energy Monitoring, Analytics, and Control" at IEEE Springfield
2012: "Sensor-driven Energy Management for Sustainable Buildings" at UMass Amherst, ECE
2010: "Nowcasting: CASA Weather Radar Demonstration" GENI Alpha Demo at GEC9
2008: "ViSE: A Virtualized Sensing Environment" at GEC3
2006: "Adaptive Virtual Machine Hosting with Shirako" at UCSD
2005: "Design and Implementation of Shirako" at UCSD

SERVICE

Community Outreach
2023: Co-Director and PI of Computer for an Equitable Energy Transition REU Site
2022: UMass Summer Engineering Institute (SENGI), UMass Turing Summer Program, Energy Transition Institute (ETI) REU Invited Talk
2020: UMass Summer Engineering Institute (SENGI)
2017: UMass Summer Engineering Institute (SENGI)
2015: STEM Starter Academy, UMass Summer Engineering Institute (SENGI)
2014: UMass Summer Engineering Institute (SENGI)
2010: Tutorial at University of Puerto Rico Mayagüez
2009: Tutorial at Green High Performance Computing Educators Conference (Holyoke CC)

Departmental
2022: ECE Department Personnel Committee (DPC); ECE Graduate Program Committee (GPC)
2021: ECE Ad Hoc Committee on Joint Curricular Programs (Chair); Graduate Program Committee (GPC)
2020: ECE Instructional Development Committee (Spring)
2019: ECE Ph.D. Poster Session Chair (Spring); ECE Faculty Search Committee (Spring); ECE Instructional Development Committee (Fall)
2018: ECE Ph.D. Poster Session Co-Chair (Fall, Spring); ECE Faculty Search Committee (Fall,Spring)
2017: ECE Ph.D. Poster Session Co-chair (Fall, Spring); ECE Faculty Search Committee (Fall)
2016: Department Personnel Committee (Spring)
2015: Seminar Committee (Spring), Department Personnel Committee (Fall)
2014: Seminar Committee (Spring, Fall), Department Personnel Committee (Spring)

College
2015: ECE representative on College of Engineering ECS Advisory Panel (Spring); ECS Sysadmin Search Committee (Spring)
2014: ECE representative on College of Engineering ECS Advisory Panel (Fall)

University
2013: Department of Energy Resources (DOER) Energy Initiative Proposal Development Team

Journal Associate Editor
2021-: SIGEnergy Energy Informatics Review (EIR), Area Chair
2018-: Elsevier Journal on Sustainable Computing: Informatics and Systems (SUSCOM)

Journal Guest Editor
2018: IEEE Transactions on Sustainable Energy, Special Issue on Intersecting Computing and Communication Technologies with Energy Systems
2017: Elsevier Applied Energy, Special Edition on Systems for Energy-Efficient Built Environments

Journal Reviewer
2019: IEEE Transactions on Cloud Computing (TCC)
2018: IEEE Transactions on Sustainable Energy (TSE); Communications of the ACM (CACM)
2017: Communications of the ACM (CACM); IEEE Transactions on Parallel and Distributed Computing (TPDS); Elsevier Energy Strategy; Software: Practice and Experience, ACM Transactions on Autonomous and Adaptive Systems (TAAS); IEEE Transactions on Cloud Computing; Elsevier Buildings and Energy; Elsevier Buildings and the Environment; Elsevier Pervasive and Mobile Computing (PMC)

2016: IEEE Internet Computing (IC), IEEE Transactions on Emerging Topics in Computing (TETC), IEEE Transactions on Dependable and Secure Systems (TPDS), IEEE Transactions on Cloud Computing (TCC), ACM Transactions on Modeling and Performance Evaluation of Computing Systems (TOMPECS)
2015: IEEE Transactions on Cloud Computing (TCC), IEEE Transactions on Parallel and Distributed Systems (TPDS), Elsevier Pervasive and Mobile Computing Journal, IEEE Pervasive Computing, IEEE Transactions on Smart Grid (TOSG)
2014: Springer Cluster Computing, Concurrency and Computation Practice and Experience
2013: ACM Transactions on Parallel and Distributed Systems (TPDS), Springer Multimedia Systems Journal, IEEE Journal on Special Areas in Communications (JSAC), Concurrency and Computation Practice and Experience

Conference Steering Committee Chair
2018-2019: ACM Conference on Energy-Efficient Buildings, Cities, and Transportation (BuildSys)

Executive Committee Member
2023-present: Chair of ACM Special Interest Group on Energy Systems and Informatics (SIGEnergy)
2018-2020: ACM Emerging Interest Group on Energy Systems and Informatics (EIG-Energy)
Led to the establishment of ACM Special Interest Group on Energy Systems and Informatics (SIGEnergy)

Journal Steering Committee Member
2019-2020: IEEE Transactions on Sustainable Computing, IEEE Computer Society Representative

Conference Steering Committee Member
2020-present: ACM International Symposium on High Performance Distributed Computing (HPDC)
2018-2020: ACM International Conference on Future Energy Systems (e-Energy)
2017-2019: ACM Conference on Embedded Systems for Energy-Efficient Buildings (BuildSys)

Organizer and General Chair
2022: ACM SIGEnergy Conference on Future Energy Systems (e-Energy)
-Co-chair with Sebastian Lenhhoff and Dan Wang
2020: ACM International Workshop on Non-Intrusive Load Monitoring (NILM)
-Co-chair with Stephen Makonin and Niki Davies
2018: NSF Workshop on Cloud Economics
5/16/18-5/17/18, Stanford, California
-Co-chair with Bhuvan Urgaonkar, Pennsylvania State University

Technical Program Committee Chair
2020: ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC)
-Co-chair with Kathryn Mohror, Lawrence Livermore National Lab
2018: ACM International Conference on Future Energy Systems (e-Energy)
-Co-chair with Sid Chau, Masdar Institute
2018: International Workshop on Non-Intrusive Load Monitoring (NILM)
-Co-chair with Nipun Batra, University of Virginia
2016: ACM Conference on Embedded Systems for Energy-Efficient Buildings (BuildSys)
-Co-chair with Burcin Becerik-Gerber, University of Southern California
2015: IEEE Workshop on Cloud Analytics (IWCA)
-Co-chair with Tim Wood, George Washington University

Organizing Committee Member
2019: ACM Multimedia Systems Conference - Finance Chair (Treasurer)
2018: ACM Emerging Interest Group on Energy Informatics and Systems (EIG-Energy) - Executive Committee
2017: ACM International Conference on Future Energy Systems (e-Energy) - Poster/Demo Chair
-Co-chair with Chuan Wu, University of Hong Kong
2017: IEEE Conference on Cloud Engineering (IC2E) - Publicity Chair
-Co-chair with Thomas Pasquier, Harvard University

2015: ACM Conference on Embedded Systems for Energy-Efficient Buildings (BuildSys) - Publications Chair
2013: ACM Workshop on Embedded Systems for Energy-Efficient Buildings (BuildSys) - Session Chair (Energy and Water)

Technical Program Committee Member
2023: IEEE Conference on Cloud Engineering (IC2E); ACM SIGMETRICS Conference (SIGMETRICS); ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC); ACM Symposium on High Performance Distributed Computing (HPDC); ACM International Conference on Future Energy Systems (e-Energy); ACM Workshop on Sustainable Computer Systems (HotCarbon); ACM Conference on Energy-Efficient Buildings, Cities, and Transportation (BuildSys); IEEE International Conference on Big Data (BigData)
2022: ACM Symposium on High Performance Distributed Computing (HPDC); IEEE International Conference on Distributed Computing Systems, Machine Learning on or for Distributed Systems track (ICDCS); IEEE Conference on Cloud Engineering (IC2E)
2021: ACM International Conference on Future Energy Systems (e-Energy); IEEE Conference on Cloud Engineering (IC2E); ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC); IEEE International Conference on Computer Design (ICCD) - Computer Systems track; ACM Conference on Energy-Efficient Buildings, Cities, and Transportation (BuildSys)
2020: IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm); ACM Conference on Energy-Efficient Buildings, Cities, and Transportation (BuildSys); IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS); ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC); ACM/IEEE Conference on Internet of Things Design and Implementation (IoTDI); ACM International Conference on Future Energy Systems (e-Energy); IEEE International Conference on Distributed Computing Systems, Cloud Computing and Data Center track (ICDCS)
2019: IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm); ACM Conference on Energy-Efficient Buildings, Cities, and Transportation (BuildSys); IEEE International Conference on Computer Design (ICCD) - Computer Systems track; IEEE International Conference on Distributed Computing Systems, Cloud Computing and Data Center track (ICDCS); IEEE International Conference of Autonomic Computing (ICAC); ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC); IEEE Conference on Pervasive Computing and Communications (PerCom); ACM/IEEE Conference on Internet of Things Design and Implementation (IoTDI); ACM International Conference on Future Energy Systems (e-Energy)
2018: IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm); ACM Conference on Embedded Systems for Energy-Efficient Buildings (BuildSys); IEEE Workshop on Smart Service Systems (SmartSys); USENIX Workshop on Hot Topics in Cloud Computing (HotCloud); USENIX Annual Technical Conference (USENIX); ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC); IEEE International Conference on Distributed Computing Systems (ICDCS); IEEE Conference on Pervasive Computing and Communications (PerCom); IEEE Conference on Cloud Engineering (IC2E)
2017: Conference on Sustainable Internet and ICT for Sustainability (SustainIT), ACM Conference on Embedded Systems for Energy-Efficient Buildings (BuildSys), IEEE International Conference on Computer Communications and Networks (ICCCN), IEEE Workshop on Smart Service Systems (SmartSys), IEEE International Conference on Cloud and Autonomic Computing (ICCAC), IEEE International Conference on Sensing, Communication and Networking (SECON), ACM International Conference on Future Energy Systems (e-Energy), IEEE International Conference on Distributed Computing Systems (ICDCS), ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC), IEEE Workshop on Pervasive Energy Services (PerEnergy), IEEE Conference on Pervasive Computing and Communications (PerCom)
2016: IEEE International Green and Sustainable Computing Conference (IGSC), IEEE International Conference on Cloud and Autonomic Computing (ICCAC), ACM International Conference on Future Energy Systems (e-Energy), USENIX Workshop on Cool Topics in Sustainable Data Centers (CoolDC), ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Anal-

ysis (SC), International Workshop on Computer and Networking Experimental Research Using Testbeds (CNERT), ITC28 Conference - Next Generation and Future Internet Architectures (ITC28), International Conference on Computer Communications and Networks (ICCCN), International Conference on Cloud Engineering (IC2E), Conference on Pervasive Computing and Communications (PerCom), Conference on Parallel Processing (ICPP), GreenMetrics Workshop, IEEE Conference on Distributed Computing Systems (ICDCS)
2015: Conference on Embedded Systems for Energy-Efficient Buildings (BuildSys), Conference on Pervasive Computing and Communications (PerCom), ACM Conference on Future Energy Systems (e-Energy) - Senior TPC member, IFIP Conference on Sustainable Internet and ICT for Sustainability (SustainIT), IEEE Conference on Autonomic and Cloud Computing (CAC)
2014: Conference on Sensing, Communication, and Networking (SECON), Conference on Future Energy Systems (e-Energy), Workshop on Cloud Analytics (IWCA), DIMACS Workshop on Data-Aware Energy Use, Smart Energy Grid Security Workshop (SEGS)
2013: Workshop on Embedded Systems for Energy-Efficient Buildings (BuildSys), Smart Energy Grid Security Workshop (SEGS), Workshop on Cyber-Physical Networking Systems (CPNS), Conference on Sensing, Communication, and Networking (SECON), Conference on Communication Systems and Networks (COMSNETS); Conference on Networked System Design and Implementation (NSDI) - External Reviewer
2012: Conference on Testbeds and Research Infrastructures for the Development of Networks and Communities (TridentCom)
2009: Workshop on Hot Topics in Cloud Computing (HotCloud).

External Reviewer
National Science Foundation (NSF) panel participation for CyberSEES, CPS, CSR, and CAREER programs. Department of Energy (DOE) panel participation for programs under the Building Technologies Office (BTO).
2023: DOE Panelist; NSF Panelist (CNS); NSF Panelist (REU)
2022: Stanford TrustDER Advisory Committee
2021: DOE Panelist; Climate Change AI (CCAI)
2020: NSF Panelist
2018: DOE Panelist
2017: NSF Panelist, DOE Panelist
2016: NSF Panelist, DOE Panelist
2015: NSF Panelist
2014: NSF Panelist

ADVISING

Ph.D. Student Advising
Xingda Chen (ECE) - 5th year (co-advised with Deepak Ganesan), passed RQE
Xiaoding (Rebecca) Guan (ECE) - 3rd year
Talha Mehboob (ECE) - 2nd year (co-advised with Michael Zink)
Thanathorn (Tammy) Sukprasert (CICS) - 1st year (co-advised with Prashant Shenoy)
John Thiede (ECE) - 1st year

Ph.D. Graduates
2022: Noman Bashir (ECE)
Thesis Title: *Improving the Programmability of Networked Energy Systems*
First Employment: Post-doc in Computer Science at UMass Amherst

2021: Akansha Singh (ECE)
Thesis Title: *Data-driven Control, Modeling, and Forecasting of Residential Solar Power*
First Employment: Post-doc at Colorado State University and the Cooperative Institute for Research in the Atmosphere (CIRA) under Imme Ebert-Uphoff

2021: Pradeep Ambati (ECE)

Thesis Title: *Cost-Efficient Resource Provisioning for Cloud-Enabled Schedulers*
-Awarded Ting-wei Tang Dissertation Prize by UMass Amherst ECE Department
First Employment: Research Scientist at Facebook, Inc.

2018: Supreeth Shastri (ECE)
Thesis Title: *System Support for Managing Risk in Cloud Computing Platforms*
First Employment: Post-doc at University of Texas Austin under Vijay Chidambaram
Current Employment: Tenure-track Assistant Professor in Computer Science at the University of Iowa

2018: Dong Chen (ECE)
Thesis Title: *Hybrid Black-box Solar Analytics and their Privacy Implications*
First Employment: Tenure-track Assistant Professor in Computing and Information Sciences at Florida International University (FIU)
Current Employment: Tenure-track Assistant Professor in Computer Science at Colorado School of Mines

2014: Sean Barker (CS)
Thesis Title: *Model-driven Analytics of Energy Meter Data in Smart Homes*
First Employment: Tenure-track Assistant Professor in Computer Science at Bowdoin College

M.S. Thesis Graduates
2019: Mythili Anbazhagan (ECE)
Thesis Title: *An Empirical Analysis of IoT Network Traffic: Device Profiling and Classification*
First Employment: Startup

2017: Pradeep Ambati (ECE)
Thesis Title: *AutoPlug: An Automated Metadata Service for Smart Outlets*
First Employment: Ph.D. student in Electrical and Computer Engineering at UMass Amherst

2017: Jiannan Tian (ECE)
Thesis Title: *Analyzing Spark on the Spot Market*
First Employment: Ph.D. student in Computer Science at University of Alabama

2016: Xue Ouyang (ECE)
Thesis Title: *SpotLight: An Information Service for the Cloud*
First Employment: Software Engineer at Amazon Web Services

2014: Zain Mustafa (ECE)
Thesis Title: *Energy Agile Inter Node Cluster Communication*
First Employment: IBM

Undergraduate Honors Thesis Advisor
2022: Chen Sun
Thesis Title: *Data driven Analysis of Energy Usage Across different Socioeconomic Groups*

2021: Grady Sullivan
Thesis Title: *Evaluating the Feasibility of Sustainable Solar Powered Edge Computing Systems*

2014: David Zeifman
Thesis Title: *Energy-Agile Data Shuffling*

Undergraduate Honors Thesis Second Reader
2021: Lamisa Sheikh
Thesis Title: *Impacts of Electrifying Heat and Grid Integration: The Giant Dipper Effect*

2021: Aidas Jakubenas

Thesis Title: *A High-Resolution Analysis of United States Power Outages from 2017-2021*

2017: Niketh Murali (CICS)
Thesis Title: *Strategies for Optimal Cloud Server Selection*

2017: Eric Gendreau (CICS)
Thesis Title: *Smart Home Energy Analysis*

2016: Ariel Meir (CICS)
Thesis Title: *Load Monitoring and Creating a Rule Engine for Smarthomes with Insteon*

Ph.D. Thesis Committees
2023: Mehmet Savasci ("Power-Performance Management for Cloud Applications"); Bin Wang ("Resource Allocation for Latency-sensitive Applications in Edge Environments"); Phuthipong Bovornkeeratiroj ("Accelerating Sustainability of the Electric Grid using Distributed Energy Resources"), Priyanka Mammen ("Enabling Scalable Sleep Monitoring with Mobile Sensing and Machine Learning"), Akanksha Atrey ("Preserving Trust and Privacy of Machine Learning Models in Resource-constrained Environment"), Russell Lee ("Learning-Augmented Online Algorithms for Energy Optimization")
2022: Zeal Shah ("Side-Channel Measurement Techniques for Monitoring Electricity Grids"), June Lukuyu ("Stimulating Electricity Demand to Enhance Sustainable Human Development in Sub-Saharan Africa")
2021: Fubao Wu ("Scalable Data Analytics for Relational, Graph Databases and Videos"), Santiago Correa Cardona ("Models and Machine Learning Techniques for Improving the Planning and Operation of Energy Systems in Developing Regions"); John Wamburu ("Data-driven modeling and analytics for greening the energy ecosystem"); Guoyi Zhao ("Data Parallel Frameworks for Training Machine Learning Models")
2019: Haroon Rashid ("Detecting Anomalous Energy Consumption in Buildings using Smart Meter Data") - IIIT-Delhi
2018: Divyashri Bhat ("QoE-Aware Content Distribution Systems for Adaptive Bit Rate Video Streaming"), Abhishek Roy ("Building a Massively Parallel and Highly-Optimized Platform for Genome Analysis Pipelines")
2017: John Vilk ("Righting Web Development"), Prateek Sharma ("Transiency-driven Resource Management for Cloud Computing Platforms")
2016: Vani Gupta ("Energy-aware Algorithms for Greening Internet-Scale Distributed Systems Using Renewables"), Cong Wang ("On the Performance of Adaptive Bit Rate Streaming and Parallel Cloud Applications"), Hao Cai ("Design and Implementation of Path Finding and Verification in the Internet"), Sudarshan Srinivasan ("Dynamic Processor Reconfiguration for Power, Performance, and Reliability Management")
2015: Jiangtao Yin ("Accelerating Iterative Computations for Large-scale Data Processing"), Xin He ("Application-aware Resource Management for Cloud Platforms"), Zhichuan Huang - University of Maryland Baltimore County ("Data, Energy, and Privacy Management Techniques for Sustainable Microgrids")
2014: Aditya Mishra ("Employing Intelligent Scheduling and Storage for Energy Optimization in Smart Buildings"), Ye Xu ("State-based Fault-tolerant Framework for Cyber-Physical Systems"), Xinming Chen ("SDN implementation of ChoiceNet")
2013: Boduo Li ("A Platform for Scalable Low-Latency Analytics Using MapReduce"), Dilip Kumar Krishnappa ("Effectiveness of Cloud Services for Scientific and VOD Applications"), Vimal Matthews ("Energy Efficient Content Delivery Networks")

Research Qualifying Exam (RQE) Committees
2023: Yi Huang ("Time-Encoding System Implementation for Vector- Matrix Multiplication with Analog Memristor Crossbar Arrays in High-Resistance States"); Adeel Nasrullah
2022: Tian Zhou ("Distributed Framework for Accelerating Training of Deep Learning Models through Prioritization"); Xingda Chen ("COCOON - A Conductive Substrate-based Coupled Oscillator Network for Wireless Communication"); Nash Lochner ("On the H2-Matrix Representation of EFIE MoM")
2021: Jin Zhou ("MemPerf: Understanding and Measuring Performance Slowdown Caused by Memory Allocators"); Bob Muhwezi ("Ingredients for Growth: Examining Electricity Consumption and Complementary Infrastructure for Small and Medium Enterprises in Kenya")
2020: Zeal Shah ("GridInSight: Monitoring Electricity Grids Using Visible Lights"), Fubao Wu ("NEMA:

Automatic Integration of Large Network Management Databases")
2018: Santiago Correa ("Deployment Strategies for Crowdsourced Power Outage Detection")
2017: Divya Bhat ("Towards Adaptive Bitrate Video Delivery in Software-Defined Networks"), Minghao Dong ("Design of an Amplitude Selective Sampling Receiver") , Guoyi Zhao ("Keeping Updated on Evolving Massive Graphs")
2016: Xiaozhe Shao ("Optimizing Locator Encoding for Internet Routing Scalability")
2015: Abhishek Dwaraki ("GitFlow: Flow Revision Management for Software-Defined Networks")
2014: Cong Wang ("On the Feasibility of DASH Streaming in the Cloud"), Hao Cai ("On 2-Way Neighbor Discovery in Wireless Networks with Directional Antennas")
2013: Dilip Kumar Krishnappa ("Cache-centric Video Recommendation: An Approach to Improve the Efficiency of YouTube Caches")

Masters Thesis Committees
2018: Rajvardhan Deshmukh, Bhushan Suresh ("Internet in a Slice: An Evaluation of SDN and NFV Support for Parallel, Alternative Protocol Stack Operations")
2017: Priyanka Dattatri ("Virtualization of Sensor Networks"), Kaihua Liu ("Query on Hierarchical Knowledge Graphs")
2016: Jingrui Li ("A One-way Proof-of-Work Protocol to Protect Controllers in Software-defined Networks")
2015: Sandesh Gubbi Virupaksha ("Accelerated Iterative Algorithms with Asynchronous Accumulative Updates on a Heterogeneous Cluster")
2014: Shuai Chen ("CryptoPaper"), Divyashri Bhat ("Seamless Application Delivery Using Software Defined Exchanges"), Xue Yu ("Information Security Service for Physical Documents"), Xin Chen
2013: Cory Gorman ("Design of an Open-source SATA Core for Virtex-4 FPGAs")

Senior Design Project Advising (ECE416)
2020: Jonah Palmer, Jacqueline Thornton, Colin Lafountain, and Jonathan Eisenbies ("AttendancePlus")
2019: Kriss Strikis, Garrett Olson, Mark Chisholm, and Brendon Burke ("Insight Home Smart Plug")
2018: Vincent Diblasio, Christopher Bartoli, George Puliafico, and Thomas Baim ("Lighthouse 9")
2017: Patrick Rauker, Marion Meirlaen, George Younes, Rimannu Saad ("Breadcrumbs")
2016: Ethan Stokes, Alexander Losh, Antoun Saad, David Varney ("Programmable Solar Tracker")
2015: Shravan Nayak, Amritpal Khalsa, Andrew Paisner, and Carlton Jones ("FRIJ")
2014: Mark Brennan, Alberto Ayala, Grant George, Seth Richardson, and Dmitriy Vasilchenko ("CloudStat: A Thermostat-as-a-Service Platform")
2013: Jack Vorwald, Ryan Holmes, Brett Kaplan, and Mike Burns ("Personal Black Box")
Competed in the Intel Cornell Cup (http://www.systemseng.cornell.edu/intel/)
Featured in Yahoo News (http://news.yahoo.com/your-own-black-box-162809896.html)

REU Students
2023: Agustin Pemberton
2022: Taisuke Miyamoto, Lavina Ngo
2020: Manuel Bauche
2018: Ebenezer Adams
2017: Joesph Breda
2016: Addly Templeton, Aaron Lucia
2013: Adarsh Subaswammy
2012: Anthony Wu
2011: Anthony Wu
2010: Justin Duperre, Sara Avila O'Neill

TEACHING

Instructor
2023: ECE570 Operating Systems (Spring); ECE670 Advanced System Software Design (Spring)
2022: ECE570 System Software Design (Spring); ECE674 Green Computing (Spring); ECE322 Systems Programming (Fall)
2021: ECE322 Systems Programming (Fall)

2020: ECE570 System Software Design (Spring), ECE670 Advanced System Software Design (Spring)
2019: ECE 570 System Software Design (Spring), ECE 670 Advanced System Software Design (Spring), ECE 674 Green Computing (Spring); ECE 322 Systems Software & Networking I (Fall)
2018: ECE 570 System Software Design (Spring), ECE 670 Advanced System Software Design (Spring); ECE373 Software Intensive Engineering (Fall)
2017: ECE 570 System Software Design (Spring), ECE 670 Advanced System Software Design (Spring), ECE 697GC Green Computing (Spring); ECE 373 Software Intensive Engineering (Fall)
2016: ECE 570 System Software Design (Spring), ECE 670 Advanced System Software Design (Spring), ECE373 Software Intensive Engineering (Fall), ECE 696 Hot Topics in Software Systems - Independent Study (Fall)
2015: ECE 570 System Software Design (Spring), ECE 670 Advanced System Software Design (Spring), ECE373 Software Intensive Engineering (Fall)
2014: ECE 696 Hot Topics in Software Systems - Independent Study (Spring), ECE 570 System Software Design (Spring), ECE373 Software Intensive Engineering (Fall)
2013: ECE 697GC Green Computing (Spring)
2012: ECE 373 Software Intensive Engineering (Fall)
2011: CSCI W014 Green Computing (Winter), Williams College
2010: Networks, Virtualization, and Cloud Computing Seminar (Winter), University of Puerto Rico, Mayagüez
2009: CSCI W011 Inside Google: The Technology and Its Impact (Winter), Williams College

AWARDED FUNDING

Total funding awarded as PI, Co-PI, or Senior Personnel while at UMass Amherst is $17.1M. Total funding awarded as PI or Co-PI is $10.8M. Total funding awarded as PI or Co-PI normalized by the percentages in parentheses below, which represent my share of the funding, is $5.1M.

1. David Irwin (PI); Jay Taneja (Co-PI). **NSF REU Site**. *Computing for an Equitable Energy Transition*. April 1st, 2023 - March 31st, 2026. $433,765 (50%).
2. David Irwin (PI); Prashant Shenoy (Co-PI); Michael Zink (Co-PI). **NSF: CCRI: New**. *A Community Testbed for Designing Carbon-Efficient Cloud Applications*. August 1st, 2022 - July 31st, 2025. $1.5M (33%).
3. Prashant Shenoy (PI); David Irwin (Co-PI). **NSF: CNS Core: Medium**. *Model-driven Resource Management for Avoiding the Performance Pitfalls of Edge Computing*. September 1st, 2022 - August 31st, 2025. $1.2M (50%).
4. David Irwin (PI); Fatima Anwar (Co-PI); Jeremy Gummeson (Co-PI). **NSF: CNS Core: Small**. *Managing Electrical and Thermal Energy in Sustainable Computing Systems*. October 1st, 2022 - September 30th, 2025. $325,965 (33%).
5. Prashant Shenoy (PI); David Irwin (Co-PI); Ramesh Sitaraman (Co-PI); Mohammad Haijesmaili (Co-PI). **NSF/VMware: NGSDI**. *CarbonFirst: A Sustainable and Reliable Carbon-Centric Cloud-Edge Software Infrastructure*. July 1st, 2021 - June 30th, 2024. $3M total, $1,956,982 for UMass (25%).
6. Michael Zink (PI), David Irwin (Co-PI), Beatriz Lorenzo (Co-PI), Fatima Anwar (Co-PI), Jeremy Gummeson (Co-PI), and Tilman Wolf (Co-PI). **Juniper Networks**. *5G Testbed for IoT Research*. August 1st, 2020 - July 31st 2022. $146,825 (17%).
7. Matthew Lackner (PI); Erin Baker (Co-PI); Robert Deconto (Co-PI); Golbon Zakeri (Co-PI); Marie Crago (Co-PI); David Irwin (Senior Personnel); Prashant Shenoy (Senior Personnel); Dwayne Breger (Senior Personnel); Alison Bates (Senior Personnel). **NSF NRT**. *Enhancing Resiliency and Increasing Equity in the Transition to a Sustainable Energy Future*. September 1st, 2020 - August 31st, 2025. $2,540,630.57.
8. Matthew Lackner (PI); Erin Baker (Co-PI); Marie Crago (Co-PI); Prashant Shenoy (Co-PI); David Irwin (Senior Personnel); Golbon Zakeri (Senior Personnel); Dwayne Breger (Senior Personnel); Alison Bates (Senior Personnel); James Manwell (Senior Personnel); Sanjay Arwade (Senior Personnel); Krista Harper (Senior Personnel); Michael Ash (Senior Personnel). **NSF: GCR**. *The Transition to a Sustainable Energy Future*. September 1st, 2020 - August 31st, 2022. $1,149,118.00.

9. David Irwin (PI); Lixin Gao (Co-PI); Prashant Shenoy (Co-PI). **NSF: CNS Core: Small.**. *Optimizing Large-scale Distributed Machine Learning for Transient Servers using Loose Synchronization*. October 1st, 2019 - September 30th, 2022. $500,000 (33%).
10. Michael Zink (PI); David Irwin (Senior Personnel); Emmanuel Cecchet (Senior Personnel). **NSF: CCRI: Grand**. *Developing a Testbed for the Research Community Exploring Next-Generation Cloud Platforms*. October 1st, 2019 - September 30th, 2023. $888,421
11. Mohammad Hajiesmaili (PI); Ramesh Sitaraman (Co-PI); David Irwin (Co-PI). **Google Faculty Research Award**. *Optimizing Energy Procurement for Data Centers using Machine Learning.* June 1st, 2019 - May 31st, 2020. $62, 311 (33%).
12. David Irwin (PI). **REU Supplement to NSF CPS-Security**. July 1st, 2018 - August 31st, 2019. $16,000 (50%).
13. David Irwin (PI); Prashant Shenoy (Co-PI). **NSF EAGER**. *Exploring the Feasibility of System Support for Managing Risk in Cloud Markets*. July 1st, 2018 - June 30th, 2020. $300,000 (50%).
14. David Irwin (PI). **NSF**. *NSF Workshop on the Economics of Cloud Computing*. January 1st, 2018 - December 31st, 2018. $90,593 (100%).
15. David Irwin (PI); Prashant Shenoy (Co-PI). **NSF CPS: Breakthrough**. *Software Defined Solar Systems*. Funded July 1st, 2017 - June 30th, 2020. $436,047 (50%).
16. David Irwin (PI). **Google Cloud Platform Education Grant**. *ECE373 Fall 2016 Projects*. Funded September 1st, 2016 - August 31st, 2017. $3,000 (100%).
17. David Irwin (PI). **REU Supplement to NSF CAREER**. June 1st, 2016 - May 31st, 2017. $18,000 (100%).
18. David Irwin (PI); Prashant Shenoy (Co-PI). **Google Faculty Research Award**. *Enhancing the Value of Preemptible Instances.* June 1st, 2016 - May 31st, 2017. $56,500 (50%). Acceptance Rate: 151/950 = 16%.
19. Prashant Shenoy (PI); David Irwin (Co-PI); Simi Hoque (Co-PI) **NSF PFI:BCI**. *Utility-driven Smart Energy Services.* September 1st, 2015 - August 31st, 2018. $1,000,000 (33%).
20. David Irwin (PI); Prashant Shenoy (Co-PI) **NSF CPS-Security:Breakthrough**. *Enhancing Privacy in Smart Buildings and Homes*. September 1st, 2015 - August 31st, 2018. $486,524 (50%).
21. David Irwin (PI). **Amazon Education Grant**. *ECE570/670 Spring 2015 Course Assignments and Projects*. Funded February 25th, 2015 - February 24th, 2016. $6,500 (50%).
22. David Irwin (PI). **Massachusetts Energy Extension Initiative**. *Towards Green Energy-efficient Data Centers: Quantifying the Cost and Energy Savings from Using Data Centers in Massachusetts*. Funded January 1st, 2015 - December 31st, 2015. $47,500 (100%).
23. Prashant Shenoy (PI); David Irwin (Co-PI). **NSF CSR:Small**. *System Support for Transiency in Data Center and Cloud Computing*. Funded September 1st, 2014 - August 31st, 2017. $500,000 (50%).
24. Prashant Shenoy (PI); David Irwin (Co-PI); Simi Hoque (Co-PI). **NSF CRI:II-NEW**. *A Programmable Data-driven Testbed for Sustainable Buildings Research.* Funded September 1st, 2014 - August 31st, 2017. $587,012 (33%).
25. Michael Zink (PI); David Irwin (Senior Personnel). **NSF CRI:NSFCloud**. *CloudLab: Flexible Scientific Infrastructure to Support Fundamental Advances in Cloud Architectures and Applications*. Funded June 17th, 2014 - June 16th, 2018. $390,00 for UMass (40%).
26. Prashant Shenoy (PI); David Irwin (Co-PI). **Massachusetts Department of Energy Resources (DOER)**. *Applying Big Data Techniques to the Smart Grid.* Funded November 1st, 2013 - October 31st, 2014. $200,000 (50%).
27. Prashant Shenoy (PI); David Irwin (Co-PI); Emmanuel Cecchet (Senior Personnel). **NSF S12-SSE**. *BenchLab: Open Community Tools and Infrastructure for Performance Research in Cloud, Mobile and Green Computing*. Funded October 1st, 2013 - September 30th, 2016. $500,000 (50%).

28. David Irwin (PI). **NSF CAREER**. *Model-based Energy Management for Sustainable Buildings*. Funded June 1st, 2013 - May 31st, 2018. $461,434 (100%).
29. Prashant Shenoy (PI); David Irwin (Co-PI). **MGHPCC Seed Fund.** *Designing Cloud and Big Data Platforms for Scientific and HPC Applications*. Funded January 1st 2013 - December 31st, 2013. $45,000 (50%).
30. Prashant Shenoy (PI); David Irwin (Senior Personnel). **NSF SDCI**. *The Missing Link: Connecting Eucalyptus Clouds with Multi-Layer Networks*. Funded September 1st, 2010-August 31st, 2013. $401,000.
31. Michael Zink (PI); Prashant Shenoy (Co-PI); Jim Kurose (Co-PI); David Irwin (Senior Personnel); Emmanuel Cecchet (Senior Personnel). **NSF/BBN GENI** (Solicitation 2). *Data-Intensive Cloud Control for GENI*. Funded October 1st, 2009 - September 30th, 2012. $534,000.
32. Jim Kurose (PI); Prashant Shenoy (Co-PI); Michael Zink (Co-PI); Deepak Ganesan (Co-PI); David Irwin (Senior Personnel). **NSF/BBN GENI** (Solicitation 1). *Sensor Virtualization and Slivering in an Outdoor Wide-Area Wireless GENI Sensor/Actuator Network Testbed*. Funded October 1st, 2008 - September 30th, 2011. $490,000.